Tinnitus Treatment
Clinical Protocols
Dedication

To
Ross Coles, Richard Hallam, Jonathan Hazell, Jane Henry,
Robert Sweetow, and Peter Wilson, pioneers in
developing tinnitus treatment protocols
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Foreword

With rare exceptions, tinnitus cannot be eliminated by conventional medical treatment with drugs or surgery. Some people who begin to notice tinnitus, whether spontaneous or induced by trauma, noise, or other insult, will experience spontaneous resolution, but many will have persistent tinnitus. For some of them, tinnitus sensation (the sound) will be joined by tinnitus suffering, with adverse effects on thinking, feeling, and other activities of daily life, including sleep. For these tinnitus sufferers, the psychological and acoustic therapies outlined in this book can help enormously.

Almost everyone would agree that hearing aids, when the patient has substantial hearing loss, can reduce tinnitus suffering. Less obviously, but nicely elaborated in several chapters, environmental noise (including the use of wearable noise-generating devices) not only can mask tinnitus but also can assist the natural process of habituation even when the tinnitus can still be heard above the noise. Phobic avoidance of environmental noise is one of many inappropriate strategies that patients with tinnitus sometimes adopt, and it should be discouraged.

The psychological therapies described in almost all of these chapters have different names and theoretical underpinnings, but all authors recognize the necessity of careful exclusion of serious medical disease (otologic and psychiatric) and unhurried education of the patient regarding the pathophysiology and epidemiology of tinnitus. In my opinion none of these methods can be effective (as outlined in Dr. Tyler’s introductory chapter) without a caring and reasonably optimistic clinician who offers a plan and makes patients feel that they are in good hands. A corollary—meant to be broadly affirming rather than cynical—is that the therapist’s compassion, knowledge, commitment, and time may be as important as the particular school of therapy.

It has been difficult—I would say impossible so far—to show that one type of psychological therapy is really better than another, using the randomized clinical trial methodology that has become standard for drug therapy. Partly this is because we don’t agree on how to measure success, partly it is because we don’t know how to measure prognosis at the beginning of treatment (so that competing therapies can be assigned groups of patients who have equal chances to get better), but surely it is also true that all of these approaches can and do work when applied with care and conviction.
Some of these therapies contradict each other. For example, Dr. Hallam’s tinnitus habituation therapy considers tinnitus to be “an essentially irrelevant stimulus,” while Dr. Mohr’s existential therapy aims to attach meaning to tinnitus. Similarly, tinnitus retraining therapy includes “directive counseling,” which for Dr. Tyler and others is not sufficiently collaborative and personalized. Despite these very real differences, each of these approaches may still be valuable, for particular therapists and particular patients. As Dr. Mohr points out, existential therapy may be most appropriate for introspective and philosophical patients (and therapists). Tinnitus habituation therapy and tinnitus retraining therapy may be better suited to different personality types. A therapist who believes in what he or she is doing—working with a patient who can share that belief—will best convey the commitment and optimism that are essential to support the patient in what is in the end self-healing.

Not all audiologists and otologists will want to offer intensive tinnitus treatment. This book will help them better understand the treatment options. Equally importantly, it will equip them to make better use of their 30-minute visits with “everyday” tinnitus patients. We don’t think of this as psychotherapy, but if done well it will be all that many patients need. For those—including psychologists—who want to make tinnitus therapy a focus of their practice, this book offers a detailed “how-to-do-it” look into the practices of some of the world’s best tinnitus clinicians.

Robert A. Dobie, MD
Department of Otolaryngology
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What should I do with this tinnitus patient? Will I be able to help? I am not trained in tinnitus treatment!

Most clinicians don’t have a concrete plan on how to provide tinnitus treatment. Some are simply unsure of what steps to take. Many simply lack the experience. However, most do have adequate training in counseling. Clinicians are trained to interact with clients, to be good listeners, and to be supportive.

The other missing ingredient is provided by this book. Tinnitus Treatment: Clinical Protocols offers practical strategies on how to treat tinnitus patients.

The book reviews some background about theories of tinnitus mechanisms and philosophical considerations for treatment. But the book is unique because 15 of the 16 chapters focus simply on treatment protocols: protocols that clinicians can put into practice today, protocols for providing handouts and producing Internet sites, protocols for individual and group therapy, protocols for sound therapy and hearing aid use, protocols written by clinical psychologists and clinical audiologists who treat tinnitus patients every week. Many of these protocols have their basis in excellent treatments that have been used successfully since the 1980s. These treatments sometimes appear to be forgotten, but their roots are evident here. The tinnitus treatment protocols are written by clinicians from established tinnitus clinics worldwide, including the United Kingdom, Denmark, Germany, New Zealand, Australia, and the United States. This clinical guide will help you to help tinnitus patients.

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What Is Tinnitus?

My favorite definition of tinnitus is from McFadden (1982). Tinnitus

- Is a perception of sound (it must be heard)
- Is involuntary (not produced intentionally)
- Originates in the head (not hearing or overly sensitive to an external sound)

I would add that the patient’s reaction should be considered. It is helpful to distinguish

- Tinnitus that is problematic from that which is not (Coles, 1987)
- How often the tinnitus occurs and how long an episode is (e.g., whether it occurs once a month for 10 seconds or is present daily)

Tinnitus has been classified in several ways, such as its presumed site of generation and whether it is audible to someone other than the patient (objective tinnitus) or the patient alone (subjective tinnitus). An objective tinnitus, heard by the examiner, may be of middle ear origin or a spontaneous otoacoustic emission arising from the sensorineural system. Therefore, the terms subjective and objective are not helpful in understanding or treating tinnitus. Therefore, tinnitus can be classified in a manner analogous to hearing loss according to site of injury or generation (Tyler and Babin, 1986); that is, whether it is middle ear, sensorineural, or central tinnitus.

The treatments described in this book are applicable to all classes of tinnitus. A thorough physical examination and treatment of identified ailments, when possible, are important first steps in treating a patient with tinnitus.

The overall impact of tinnitus on a patient is influenced by the characteristics of tinnitus and of that particular patient (Dauman and Tyler, 1992). For example,
I believe that tinnitus is more likely to be annoying if it is louder or has a screeching quality. Some authors have incorrectly suggested that psychoacoustic factors are unimportant or unrelated to tinnitus annoyance. Psychoacoustic factors are indeed relevant, although they are only one thing to consider in understanding the effect tinnitus has on a patient. An absence of high correlation between loudness and annoyance does not mean that loudness is not important. Stouffer and Tyler (1990) concluded that patients with soft tinnitus are not under as much stress as those who report a loud tinnitus. Also, patients who are under stress or have not had adequate sleep find the tinnitus more annoying.

Tinnitus is not a personality disorder, but psychological factors are involved in the development and maintenance of this problem (see, e.g., Fowler and Fowler, 1955). Although patients with severe tinnitus can have clinical depression, in my experience serious psychological problems are rare among most tinnitus patients. Very few of us, after all, would not be bothered at all if we constantly heard an unwanted sound that we had no control over.

Neurophysiological Models of Tinnitus

Neurophysiological models can be considered from many different aspects. In the normal auditory system, increases in spontaneous activity evoked by acoustic stimuli are thought to be the basis for sound perception. Therefore, neurophysiological models have logically nominated an increase in spontaneous activity in the absence of acoustic stimulation as the mechanism of tinnitus. Wherever the site of origin, most probably this must be transmitted to and result in an increased spontaneous rate in the auditory cortex. Table 1–1 reviews a few of the neurophysiological models that have been proposed over the years (for reviews, see Cacace, 2003; Eggermont, 2000; Eggermont and Roberts, 2004; Jastreboff, 1990; Salvi, Lockwood, and Burkard, 2000; Vernon and Moeller, 1995). Some of these are specific to precise anatomic or physiological sites; others are more general models referring to processing principles.

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<th>Author(s)</th>
<th>Description</th>
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<td>Kiang, Moxon, and Levine (1970)</td>
<td>Edge between normal and absent hair cells and subsequent neural activity</td>
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<td>Tonndorf (1981)</td>
<td>Decoupling of stereocilia between the hair cells and tectorial membrane</td>
</tr>
<tr>
<td>Moeller (1984)</td>
<td>Cross-talk (interneural synchrony) between nerve fibers</td>
</tr>
<tr>
<td>Eggermont (1984)</td>
<td>Tinnitus a result of automatic gain control system of central nervous system (e.g., normally increasing the sensitivity in quiet), linked to outer hair cells</td>
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<td>Hazell (1987)</td>
<td></td>
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<tr>
<td>Penner and Bilger (1989)</td>
<td>Spontaneous otoacoustic emissions</td>
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<tr>
<td>Jastreboff (1990)</td>
<td>Discordant inner and outer hair cell damage (damaged outer hair cells with reasonably intact inner hair cells)</td>
</tr>
<tr>
<td>Salvi et al (1996, 2000)</td>
<td>Increase in central neurons tuned to similar frequencies following reorganization of peripheral hearing loss</td>
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In general, many of these models are insightful and clever. For models to be useful, they should be testable or should lead to a broader understanding and eventually a testable hypothesis.

I believe that, whatever the initial source of tinnitus, it must be perceived in the auditory cortex (see Tyler, 1981, p. 136). Broadly, there are three different ways that the mechanism of tinnitus can be coded in the auditory cortex:

- Increased spontaneous activity fed by increase or decrease in activity or edge in activity (Kiang et al, 1970)
- Cross-fiber correlation with normal or increased spontaneous activity (Eggermont, 1984; Moeller, 1984)
- More fibers with similar best frequency following hearing loss–induced auditory plasticity (Salvi et al, 1996, 2000)

Fig. 1–1 shows a schematic representation of how we hear, interpret, and react to sounds. Sound is transformed from acoustic to electrical information in the cochlea. It is transmitted through the brainstem to the auditory centers of the brain within the temporal lobe of each hemisphere. Other parts of the brain are involved in our memory for sounds and our emotional reaction to them. Such neurophysiological models of hearing have existed for decades and were applied to tinnitus as early as 1988 (Goodey, 1988). Although the mechanism responsible for the source of tinnitus initiation may arise anywhere, its representation in the nervous system must be transmitted to the brain. Wilson (1987, pp. 30, 31) suggested that tinnitus is coded in the auditory cortex “by virtue of the pattern of activity over many cells.” Like normal sounds, any reactions patients have to their tinnitus must involve other regions of the brain, such as the amygdala and the autonomic nervous system. Hallam et al (1984, p. 44) discussed “neurophysiological models of habituation” and their importance in understanding and treating the emotional components of tinnitus. This model was widely accepted at the time (e.g., Hazell et al, 1985, p. 74).

Noise-induced hearing loss, one of the most common causes of tinnitus, is known to inflict cochlear damage. Early studies of noise-induced hearing loss emphasized that outer hair cells are affected first and then inner hair cells (e.g.,

![Figure 1–1](image-url)
Liberman and Dodds, 1984). However, I have argued that tinnitus must also intimately involve the brainstem and cortex (Tyler, 1981, p. 136). This was based on several observations, including that

- Sectioning the auditory nerve is often ineffective in reducing tinnitus.
- Masking can be just as effective in the ear ipsilateral to the tinnitus as in the ear contralateral to the tinnitus (e.g., Tyler and Conrad-Armes, 1984).
- One can observe that a person who is convinced about hearing tinnitus in the right ear can suddenly hear the tinnitus in the left ear when the right ear tinnitus is masked.

Coles (1987) also noted, as have many others since, that disorders of the central auditory pathways can cause tinnitus.

It is of interest, and perhaps a puzzle, that tinnitus can be influenced by other neurophysiological systems (for recent reviews, see Cacace, 2003, 2004; Levine et al, 2003). For example, in some patients tinnitus can be altered by touches to the hand, jaw movement, pressure to the head, and changes in eye gaze.

Of course, because tinnitus can provoke emotional reactions, other neurophysiological systems that are responsible for emotions must also be involved, including the autonomic nervous system and the amygdala. Both Hallam et al (1984) and Slater and Terry (1987) described how the autonomic nervous system is involved in tinnitus. This unconscious involuntary control system is for “fight or flight.” The sympathetic system sets up the body for action, and the parasympathetic system operates after the extra alertness is past, to bring the body from its “highly aroused state to its normal state” (Slater and Terry, 1987, p. 177). The authors emphasized how the “dangers” sensed are typically stress related, and reviewed in great detail the neurophysiological responses. They suggested coping strategies (e.g., relaxation techniques) as a treatment for the “inappropriate” autonomic response of tinnitus patients. It has been known for decades that the limbic system of the brain is involved whenever emotions are triggered (for reviews, see LeDoux, 1994; Mega et al, 1997). Jastreboff (1990) pointed out that the limbic system therefore must be involved in tinnitus patients who have emotional reactions. Cacace (2003) prefers the term *amygdala* to *limbic system*.

I like the way Goodey (1988, p. 84) explains tinnitus to his patients: “Too few messages are passing through the ear to keep the hearing nerve busy and ... especially in quiet conditions, the electrically active nerve generates its own messages which are heard as tinnitus.”

**Psychological Models of Tinnitus**

Physiological and psychological models are inherently linked. One cannot have a change in thinking or behaving without some neurophysiological correlate. Studies, and related conceptual frameworks, that focus on thinking and behaving can be considered psychological. Table 1–2 reviews some psychological frameworks for considering tinnitus treatment.

These models are certainly not mutually exclusive. For example, Hallam et al (1984), in their habituation model, noted that an organism needs to analyze (or attend to) new and potentially important stimuli. How we think about tinnitus
influences our inclination to attend to it. External events can reinforce or inhibit our behavior. Learning theory, particularly classical conditioning, has been proposed as an important factor in the reaction to tinnitus (e.g., Jastreboff, 2000; McKenna, 2004). Hallam et al (1984, p. 44) suggested that “habituation can be delayed by intense, aversive and unpredictable stimuli to which affective significance has been attached by learning.”

**Categories of Tinnitus Treatments**

We can categorize tinnitus treatments in two ways. First, a treatment can focus on the tinnitus directly, reducing its magnitude or eliminating it completely. This can be accomplished by medications (e.g., Dobie, 1999; Murai et al, 1992) or electrical suppression (e.g., Dauman, 2000; Dobie et al, 1986; Quaranta et al, 2004; Rubinstein and Tyler, 2004; Zwolan et al, 1992). Although there have been important gains in both of these approaches, no clinical protocol is currently available, and they will not be reviewed in this book.

Second, it is possible to treat a patient’s reaction to tinnitus. Medications can be used to treat patients with depression and anxiety and to help with sleep problems. Chapter 4 in this book highlights how some of the more common medical conditions influence the counseling strategy. Medications for some patients are important, but they are not specific to tinnitus and will not be reviewed here. Counseling and sound therapy are two treatments that have been in common use since the early 1980s.

**Counseling in the Treatment of Tinnitus**

Whether we spend 1 minute or 60 minutes with a patient, talking with and listening to the patient are the cornerstone of the current treatment. Counseling for tinnitus patients is often performed by audiologists without a strong theoretical background in the many counseling strategies available. Psychologists frame different counseling approaches (and there are literally hundreds) using very specific guidelines. Table 1–3 provides a few examples of these frameworks, taken from an excellent summary by Flasher and Fogle (2004).
These theoretical frameworks are also not mutually exclusive, but I suspect that tinnitus counseling would benefit from a deeper understanding of the theoretical background of different counseling approaches. Those clinicians who have some training in these approaches will put themselves in a better position to serve their tinnitus patients.

**Be Supportive**

We, and others, have noted how important it is to be supportive and to offer positive encouragement to the tinnitus patient (e.g., Coles and Hallam, 1987; Hazell, 1987; Tyler et al, 2001). This applies to any counseling strategy and includes the following:

- Be perceived as a knowledgeable professional.
- Demonstrate that you understand tinnitus.
- Provide a clear therapy plan.
- Be sympathetic.
- Show that you sincerely care.
- Provide reasonable hope.

Whatever counseling strategy is adopted, adherence to these general guidelines will likely be helpful.

**Provide Information**

Most of the therapies designed for tinnitus provide information. Whichever neurophysiological or psychological model you adhere to, providing information helps patients better understand their problems and feel less victimized, and puts them in a position of moving forward in treatment. Table 1–4 outlines the kinds of information that can be provided.

The relative importance of each of these topics is unclear. It is unlikely that discussing any of them would have a negative impact, and thus the question really is which to include or exclude, and how much time to spend on each topic. Obviously, too much information can be overwhelming for some patients, and it is possible to provide the information in too much detail or without sufficient clarity. This may prevent a patient from engaging in the other aspects of the

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<td>Existential therapy</td>
<td>Concerns with individual’s overall existence in life, and how one deals with problems. Considers uncertainty, meaning, and isolation (see Chapter 15)</td>
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<tr>
<td>Cognitive therapy</td>
<td>Thoughts influence behavior, erroneous ways of thinking are identified, and steps for coping and correcting thoughts are identified (see Chapters 6 and 8)</td>
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<td>Humanistic therapy</td>
<td>Promotes personal growth and positive support in a nondirective fashion (see Chapters 5 and 15)</td>
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<tr>
<td>Behavioral therapy</td>
<td>Focus is on changing the ways patients behave (see Chapters 6, 9, and 14)</td>
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We have proposed using pictures to facilitate the counseling process (see Tyler and Bergan, 2001). Many of the counseling components of treatment focus primarily on providing information about hearing, hearing loss, and tinnitus (e.g., Bentler and Tyler, 1987; LaMarte and Tyler, 1987; Sheldrake et al, 1985; Tyler and Babin, 1986; Tyler and Baker, 1983). Some researchers, such as Hallam (1989), include discussions about habituation and attention in their approaches (see Chapters 6 and 10 in this book), whereas others focus more on brain mechanisms and learning. All of the clinicians writing in this book provide information on their particular counseling approach, and the diversity of topics and emphasis is evident. For example, in Chapter 2, Sizer and Coles present an informative brochure for patients, often a useful item to help patients remember tinnitus facts. Andersson and Kaldo in Chapter 3 show how the Internet can be used by patients to facilitate the transfer of information in conjunction with clinic visits. Newman and Sandridge in Chapter 14 show how the information can be shared efficiently in group therapy. Many treatments for tinnitus are limited to providing information, and for many patients that is enough. If you can explain the causes of some problems, and perhaps even tell patients how they should react, this can be sufficient for patients’ understanding of their problems. With such knowledge, some patients

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<td>Anatomy and physiology of hearing</td>
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<td>Hearing loss</td>
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<td>Anatomy and physiology of hearing loss</td>
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<td>Tinnitus epidemiology</td>
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<td>Causes of tinnitus</td>
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<td>Tinnitus mechanisms</td>
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<td>Spontaneous activity of nerves</td>
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<td>Neurophysiological models (see Table 1–1)</td>
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<td>Role of the brain in perceiving and reacting to sound</td>
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<td>Habituation</td>
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<td>Effect of repeated exposure to stimuli</td>
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<td>Consequences of fearful stimuli</td>
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<td>Factors that contribute to attention</td>
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<td>Factors that contribute to concentration</td>
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<td>Auditory training</td>
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<td>Things that influence our hearing and understanding</td>
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<td>Lifestyles</td>
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<td>How our overall lifestyle, including eating, exercise, and activities, influences our health</td>
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<td>How our self-image influences our beliefs and reactions</td>
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<td>Treatment options for hearing loss</td>
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<td>Variety of treatment options available for hearing loss, including hearing aids, cochlear implants, and auditory training</td>
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<td>Treatment options for tinnitus</td>
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<tr>
<td>Variety of treatment options available for tinnitus, including coping strategies, relaxation therapy, cognitive behavior therapy, and sound therapies</td>
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will change their behavior regarding tinnitus. This is generally referred to as cognitive restructuring.

However, much more is involved in most counseling procedures than just providing information, or directing patients to some information that may be important. The next section discusses some counseling options.

Components of Counseling

Briefly, there are three components of most successful counseling programs:

- Changing thoughts
- Changing behavior
- Understanding an individual patient’s needs

Changing Thoughts

Providing information can change the way patients think about their tinnitus. However, simply lecturing a patient is not enough, even if the information is useful. Understanding what caused the tinnitus, how the patient learned to react to it, and how the patient can help himself or herself is important. This is a key part of treatments that include aspects of cognitive therapy (see Hallam et al, 1988; see also Chapters 6, 8, and 10 in this book), even for young children (see Chapter 16).

Changing Behavior

Sometimes it is possible to change behavior simply by providing information. However, it is usually more effective to practice the desired behavior. Some coping strategies involve changing behavior; others deal with emotional reactions. Providing specific tasks to engage in is part of changing behavior. Chapters 5, 9, and 14 offer numerous examples of engaging the patient in behavior management.

Understanding an Individual Patient’s Needs

A broader perspective on tinnitus treatment involves understanding the individual patient, how the person views tinnitus, what support the patient has, and how tinnitus fits into the bigger picture of the patient’s overall life. Listening, as opposed to providing information, is the first step. Tinnitus existentialist therapy, as discussed in Chapter 15, is a wonderful example of this.

Examples of Counseling Treatment Protocols

Several counseling treatment protocols and strategies have been proposed. Most contain some aspect of providing information. Several go beyond that. Tyler and Baker (1983) suggest that counseling needs to consider all of the patient’s difficulties. They recommend that the major emphasis of counseling address the emotional problems related to tinnitus. Hazell (1987, p. 113) suggests that “it is fruitless and unrealistic to approach the tinnitus in isolation.” Table 1–5 reviews some of these protocols and strategies.
| **TABLE 1–5 Tinnitus Treatment Counseling Strategies** |
|-----------------|-----------------|-----------------|
| Tyler and Baker (1983) | Informational counseling | Providing information |
| Tyler and Babin (1986) |  | Considering emotional problems related to tinnitus |
| Tyler et al (1989) |  |  |
| Clark and Yanick (1984) | Informational counseling | Understanding individual patient needs |
|  |  | Nurturing expectations |
|  |  | Sleep |
|  |  | Changing attitude and self-esteem |
|  |  | Diversionary tactics (attention) |
|  |  | Coping strategies |
|  |  | Cognitive behavior therapy |
|  |  |  |
| Hallam (1989) | Habituation therapy | Habituation |
|  |  | Attention |
|  |  | Relaxation |
| Coles (1987), Coles and Hallam (1987) | Habituation therapy | Providing information |
|  |  | Relaxation |
|  |  | Habituation of reaction to tinnitus |
| Hazell (1987) | Masking therapy | Providing information |
|  |  | Consideration of all the patient’s problems (e.g., business, financial, and domestic) |
|  |  | Reassurance |
|  |  | Attention |
|  |  | Relaxation |
|  |  | The use of diaries |
|  |  | Modifying the environment |
| Slater and Terry (1987) | Guided therapy | Providing information |
|  |  | Attention |
|  |  | Activities |
|  |  | Habituation |
|  |  | Lifestyle changes (being positive and active) |
|  |  | Coping |
|  |  | Various relaxation procedures |
| Stouffer et al (1991) | Informational counseling | Providing information |
|  |  | Keeping diaries |
|  |  | Changing activities |
| Jastreboff and Hazell (1994) | Retraining therapy | Providing information |
|  |  | “Directive” approach |
| Davis (1995) | Living with tinnitus | Providing information |
|  |  | Stress management |
|  |  | Sleep |
|  |  | Changing thinking |

(Continued)
COGNITIVE BEHAVIORAL THERAPY

Cognitive behavioral therapy has been applied to tinnitus for some time, has been discussed in the literature in great detail, and is arguably the only approach that has been shown to be effective in controlled studies (Andersson and Lyttkens, 1999; Dobie, 1999). Several general concepts are used in many tinnitus counseling protocols, although not always acknowledged. The “providing information” component is intended to change the way individuals think about their tinnitus. The basic premise of cognitive behavioral therapy (Henry and Wilson, 2001, 2002; Sweetow, 1984, 1986; see also Chapter 8 in this book) is the following: Your tinnitus is there. The way that you think about it results in a particular emotional reaction.

DIRECTIVE COUNSELING

One approach, directive counseling, or retraining therapy, stands alone in that it explicitly frowns upon considering individual needs, addressing personal concerns, and providing suggestions for initiating behavioral changes. For example, Jastreboff (1999, p. 291) describes it as a “teaching session”: “It is not, and never was, intended to be … collaborative.” Furthermore, it was never intended to “change a patient’s perception, attention and emotions towards tinnitus . . . , to improve a patient’s well-being, everyday life, social interactions and work abilities.”

The directive counseling approach prompted some concerns from several clinicians. For example, Wilson et al (1998) criticized retraining therapy for its “teaching” approach to counseling, which seemed to disregard standard counseling procedures that include a more interactive approach. Retraining therapy omitted basic principles leading the patient to discover unhelpful thoughts, develop realistic beliefs and attitudes, and modify their emotional response. Kroener-Herwig et al (2000) went on to criticize many components of retraining

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<th>TABLE 1–5 Tinnitus Treatment Counseling Strategies (Continued)</th>
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<td>McKenna (1998)</td>
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<td>Tyler and Erlandsson (2000)</td>
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therapy, one of which was that it “completely neglected” procedures to help the patient modify behavior. They believed that many tinnitus sufferers require more sophisticated strategies than simply teaching information to them. Instead, they felt that some patients should receive intervention programs to change their beliefs about tinnitus, their emotions and behavior. McKenna (2004) questioned the underlying philosophy of Jastreboff’s model, noting that its reliance on a classical conditioning perspective ignores the human component of tinnitus.

**Sound Therapies for Treating Patients’ Reactions to Tinnitus**

Sound has been used for decades to treat tinnitus. Its role can be understood in terms of

- Reducing the attention drawn to the tinnitus
- Reducing the loudness of the tinnitus
- Substituting a less disruptive noise (background sound) for an unpleasant one (tinnitus)
- Giving the patient some control (Coles, 1987; Vernon, 1977)

Sound therapies include the use of background sound, hearing aids, total masking, partial masking (including retraining therapy), and music therapy. Most of the chapters in this book include sound therapy directly or indirectly.

**Counseling for Sound Therapies**

Virtually all sound therapies are combined with some form of counseling, even if it is just providing information. More typically, in addition to basic information about tinnitus, hearing loss, attention, and habituation, specific counseling is included on the use of sound. This is true whether the sound therapy uses hearing aids or partial masking. Bentler and Tyler (1987), in their discussion of sound therapies, noted that, regardless of the management regimen chosen, counseling needs to be considered an integral component. Coles (1987, p. 395) said that “good counseling will go far toward interrupting the sort of vicious cycles” in addition to the sound therapy. Table 1–6 lists some of the topics that are typically covered in counseling for sound therapy.

Occasionally, sound therapies are represented as if they do not include counseling. For example, Henry and Wilson (2002, p. 574) suggest that no specific counseling protocol has been published for partial or total masking. This is at odds with the tinnitus partial masking therapy proposed by Hazell (1987). In Hazell’s discussion of masking therapy, detailed counseling strategies are an essential component. In my opinion, no sound therapy should be administered without counseling. Davis (Chapter 11), Searchfield (Chapter 12), and Folmer et al (Chapter 13) share this perspective.

**Use of Hearing Aids**

Listening to background sound has been recommended in treating tinnitus for over 50 years (Goodhill, 1950). Because most patients with tinnitus also have
hearing loss, the use of hearing aids to amplify the background noise is a logical step (Johnson and Goodwin, 1981; Vernon and Schleuning, 1978), and many clinicians note the benefit (e.g., Bentler and Tyler, 1987). Chapter 12 provides an excellent detailed strategy for fitting hearing aids for tinnitus patients.

Total Masking Therapy

With total masking therapy, the patient no longer hears the tinnitus. This has some obvious appeal, and many patients find it very helpful. An important benefit is providing the patient with control. A detailed total masking therapy was proposed by Vernon and Schleuning (1978), Vernon and Meikle (2000), Hazell (1987) (see also Hazell et al, 1985), and Slater and Terry (1987). Hazell and Wood (1981) emphasized the importance of using a broadband signal. The large-scale study of tinnitus maskers by Hazell et al (1985) demonstrated the effectiveness of tinnitus masking. They found that counseling is helpful and that masking can provide additional benefit. However, some patients do not like the noise generated with masking, and for others the required noise can be too loud. One of the main advantages of total masking over other forms of masking, including setting noise at the “mixing point,” as in retraining therapy (Jastreboff and Hazell, 1993), is that some patients enjoy the immediate relief of the complete elimination of the tinnitus.

There is a misperception that total masking therapy provides only temporary relief and that the benefit of total masking is helpful only while the tinnitus is being masked (see, e.g., Henry and Wilson, 2002; Jastreboff and Hazell, 2004, p. 210). Neither of these points is true. Providing the patient with relief and control is very important with total masking and all forms of partial masking. With counseling, all forms of sound therapy can break the vicious cycle and facilitate dramatic long-term benefits. For example, Hazell (1987) recommended that patients be instructed not to expect maximum benefit immediately; instead, 2 or 3 months of masker use may be required. Furthermore, Hazell noted the beneficial long-term effects of masking: “As the patient focuses less attention on the tinnitus while it is masked, it may become less troublesome and obtrusive when the masker is removed” (p. 114). Total masking therapy is one of the options discussed in Chapter 13.

**Fig. 1–2** shows a schematic representation of total masking. For many patients, it will not be possible to mask the tinnitus, and for others, the noise required is so intense that total masking is inappropriate.
The noise can sometimes result in an increase in the tinnitus. Tyler and Bentler (1987) suggest:

- Occasional rest from the noise generator
- Changing the level or spectrum of the noise generator

Other strategies for limiting the potential influence of noise on speech or everyday sound perception are:

- Use low-level noise in the region of 500 to 3000 Hz.
- Use a unilateral masker.

**Partial Masking Therapy**

In the late 1970s and early 1980s, several researchers observed that some patients required high levels of noise to mask the tinnitus, or even could not mask the tinnitus completely. Vernon and Schleuning (1978) stressed that the actual level of the noise should be under the control of the patient. Hazell and Wood (1981) found that the masking noise can be set so that the patient hears both the masking sound and the tinnitus. They noted that the noise provides a distraction that makes patients concentrate less on the tinnitus itself. Other authors reported that the intensity of the tinnitus can be reduced with the use of noise that did not completely mask the tinnitus, or partial masking.

This approach allowed patients to determine the level of noise they could tolerate. Hazell (1987, p. 114) said that the masking sound “is most often effective at an apparent intensity much less than that of the patient’s tinnitus.”

*Partial masking* is a term that comes from the psychoacoustic literature, referring to the observation that the loudness of a tone can be reduced in the presence of background noise (see, e.g., Scharf, 1971). Jastreboff and Hazell (1993) have argued that using partial masking at the mixing point, with the noise and the tinnitus audible, is important to facilitate habituation. This may or may not be true. Habituation can occur with counseling alone (see Chapter 6 in this book), even

**Figure 1–2** A schematic representation of total masking. With total masking, the tinnitus cannot be heard. Instead, the masker is perceived.

![Figure 1–2](image_url)
with total masking therapy. If it is important to be able to hear the tinnitus to facilitate habituation, it may be that low levels of partial masking below the mixing point are more desirable because the sound of the tinnitus would be similar to its usual quality and loudness. I was taught that the terms *masking* referred to a psychophysical phenomenon and *suppression* to a physiological phenomenon, but these words often have been used interchangeably. We do not know the mechanism of partial masking, but it is important that we be clear when we reference psychophysical or physiological observations.

**Table 1–7** reviews several sound therapies that have promoted partial masking, together with the instructions provided to the patient.

Detailed protocols for fitting “maskers,” including partial masking, is provided by Hazell and Wood (1981), Sheldrake et al (1985), and Hazell (1987). The use of sound therapy, including partial masking, is reviewed in Chapter 13.

**Fig. 1–3** shows a schematic representation of partial masking. The advantages of this procedure are that a comfortable level can be found for most patients and that precise levels are not targeted, which may concern a patient or focus attention on the tinnitus. One disadvantage is that even low levels can interfere with speech perception; another is that some patients will find any background sound bothersome. These disadvantages are found for all types of sound therapy.

### TABLE 1–7 Examples of Descriptions of Partial Masking in the Literature

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Description</th>
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<tr>
<td>Tyler and Babin (1986)</td>
<td>“Both the noise and tinnitus are heard, but the tinnitus is reduced in loudness” (p. 3213). Patients should “use the lowest level masker that provides adequate relief” (p. 3213).</td>
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<tr>
<td>Coles and Hallam (1987)</td>
<td>“A low level background sound against which the loudness of the tinnitus is reduced” (p. 994).</td>
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<tr>
<td>Erlandsson et al (1987)</td>
<td>Reduced the noise from the complete masking condition until it was “comfortable enough to listen to” (p. 40).</td>
</tr>
<tr>
<td>Hazell (1987)</td>
<td>“The masking sound does not completely cover the tinnitus,” and it provides a “distracting background sound” (p. 107). The “tinnitus tends to ‘break through’ the masking noise” (p. 112).</td>
</tr>
<tr>
<td>Coles (1987)</td>
<td>“When the masker is used to provide only a low level of background sound against which the loudness of the tinnitus is reduced” (p. 398).</td>
</tr>
<tr>
<td>Tyler and Bentler (1987)</td>
<td>“Sometimes a masker can reduce the tinnitus loudness or annoyance, even though the tinnitus remains audible” (p. 55). “Partially mask the tinnitus yet produce the lowest SPLs and the least interference with speech” (p. 59).</td>
</tr>
<tr>
<td>Bentler and Tyler (1987)</td>
<td>“Urge the patient to use the lowest . . . masker level that provides adequate relief” (p. 30).</td>
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</table>
A specific subcategory of partial masking has been described by several authors. Hazell (1987), for example, noted how it is better for some patients to have the tinnitus just audible through the masking sound. Coles (1987) suggested that the masker be turned up until its loudness is equal to that of the tinnitus, when the patient will often have to listen hard to hear it: “When this ... is done the patient will usually accept that [the tinnitus] is no longer something to worry about” (p. 398).

Jastreboff (1998, p. 93) later referred to this as the mixing point, “where the patient perceives that the tinnitus sound and the external sound start to mix or blend together.”

The value of the mixing point over other levels afforded by partial masking has not been tested. As noted by Hazell (1987) and Coles (1987) above, the partial masking level at which the noise and tinnitus are similar will likely be preferable for some patients.

Fig. 1–4 shows a schematic representation of the mixing point, where the masking noise is at a level similar in magnitude to the tinnitus. Some patients find it difficult to determine the mixing point, whereas others find that the noise required for a mixing point is so intense that the lower levels of partial masking are preferable.

**Music Therapy**

For many tinnitus sufferers, listening to background music represents a more acceptable and even pleasant alternative to background noise. Slater and Terry (1987) found that almost 50% of tinnitus patients they sampled listened to music to help with their tinnitus. I believe that the use of music therapy with tinnitus patients deserves much more attention than it currently gets. The use of background music is recommended by Searchfield in Chapter 12 and by Folmer and colleagues in Chapter 13. A very specific protocol is reviewed by Davis in Chapter 11.
Sound Therapy for Tinnitus Accompanied by Hyperacusis

WHAT IS HYPERACUSIS?

In a patient with hyperacusis, sounds that would normally be considered loud are instead heard as very loud. Thus loudness discomfort levels for pure tones are lower than normal, perhaps at 80 or 90 dB HL (for a review, see Nelting, 2003). It has been many years since hyperacusis was first associated with tinnitus (Tyler and Conrad-Armes, 1983). Hazell et al (1985) reported that the mean uncomfortable loudness levels in tinnitus patients were 10 to 15 dB lower than in hearing-impaired patients without tinnitus. However, the relationship between tinnitus and hyperacusis remains obscure. Loudness is thought to be coded by the number or level of activity of nerve fibers. The presence of hyperacusis implies that, for a given intensity, more nerve fibers or a higher rate of activity is produced than would occur normally. Hazell (1987) suggested that the central nervous system exerts a “gain control” mechanism to increase peripheral sensitivity affecting outer hair cell activity and tinnitus. This concept was included in a later model proposed by Jastreboff (1990) of a gain control mechanism involved in tinnitus.

HYPERACUSIS TREATMENT IN TINNITUS PATIENTS

The presence of hyperacusis in tinnitus patients requires some additional counseling and sound therapy considerations. Some patients develop a fear of sounds, or phonophobia. The main difficulty with hyperacusis in the treatment of tinnitus arises because the use of sound therapy can sometimes result in exacerbation of the hyperacusis or phonophobia. Therefore, it is important that clinicians treating tinnitus determine if their patients have hyperacusis, and to accommodate this if they are using sound therapy.

Sheldrake (1986, cited by Coles, 1987) recommended that noise generators be worn for hyperacusis patients for ~6 hours per day. The noise should be
“audible but comfortable (not necessarily completely masking any tinnitus . . .)” (p. 399). Sheldrake suggested that hyperacusis patients recovered over a period of a few days to up to 6 months in some cases; many patients gradually regain their tolerance of loud sounds.

Hazell (1987, p. 109) proposed a treatment of hyperacusis using a gradual and continuous introduction of sound into the ear to desensitize the ear to the effects of loud sounds. He noted that many hyperacusis patients use earplugs or earmuffs to protect their ears from loud sounds, but said that “it cannot be overstressed how counterproductive these measures are,” and that their use should be discouraged. Instead, he proposed a hyperacusis treatment procedure that begins with low levels of masking sound. Hazell recommended that the noise level be increased in level and duration gradually. A similar approach to hyperacusis has been suggested by Jastreboff et al (1998), except that they suggested the noise be used all the time. We note that hyperacusis patients often have hearing loss, and that the use of noise “all the time” may be unrealistic and can interfere with speech perception. Coles (1987) also cautioned against the use of earplugs in hyperacusis patients. Vernon and Press (1998) have suggested a desensitization protocol, whereby patients listen to intense, but not uncomfortable, “pink” noise for ~2 hours per day.

Phonophobia, the abnormal fear of sounds, is not necessarily related to loudness. The fear can be related to a specific sound or general class of sounds. Phonophobia can be helped by treating hyperacusis. It may be useful to follow the psychological principles of successive approximations. Starting with the least aversive sound, the approach would be to gradually expose the patient to sounds that are more and more similar to the sounds that elicit the phonophobia. Research is needed on treating hyperacusis and phonophobia.

Obstacles to Tinnitus Treatment

Negative Beliefs by Clinicians or Patients

Many clinicians have beliefs that represent obstacles to tinnitus treatment. For example, they believe that

- They do not have the training.
- They cannot help the patient.
- They will not be reimbursed.

One of the primary purposes of this book is to provide very concrete examples of a variety of treatment strategies. Audiologists, clinical psychologists, and otologists should have the training to implement most of these options. I believe patients can be helped by all the treatments described in this book. Research will eventually determine which are the most helpful and which treatments work best for which patients. Reimbursement should follow studies showing treatment effectiveness; when that happens, more clinicians will make the time to provide tinnitus treatment. It is our job, as clinicians, to show patients how to learn to live with their tinnitus.

Patients also have concepts that are obstacles. They sometimes believe that

- There is nothing that can be done.
No one understands their tinnitus.
Someone, somewhere, has the cure.

Patients who believe nothing can be done to ease the tinnitus often do not seek treatment. This can delay intervention and creates a more problematic case of tinnitus by the time the patient finally seeks help. The beliefs that nothing can be done and that no one understands are distressing to patients. Their crisis deepens, and they may withdraw further. Desperate patients with the financial resources will travel great distances and pay substantial fees if they believe there is hope for them. If they are unsuccessful, this often makes their situation worse. By providing good therapy, and demonstrating it by measuring clinical effectiveness and making this information public, patients in need will seek help.

DURATION AND NUMBER OF SESSIONS

The optimal number and duration of treatment sessions will vary across patients. Some patients will require long-term follow-up visits; this should not be viewed as inherently undesirable. For many patients, a simple 5-minute discussion will be sufficient. For others, much longer sessions will be necessary (see Tyler and Erlandsson, 2000, for strategies). The clinical psychology literature indicates that most patients will benefit from several short (less than 1 hour) visits over several weeks.

Hazell (1987) suggested that sound therapy typically requires 2 to 3 months of noise-generator use before any benefit is achieved. Research can be used to determine the optimum treatment duration. This will vary across individuals. The number of sessions and their duration will likely be linked to reimbursement.

REIMBURSEMENT

Reimbursement is often available for diagnosing hearing loss and tinnitus. In the United States, there are reimbursement codes for treating central auditory processing disorders and for providing aural rehabilitation. Additionally, there are numerous reimbursement codes for providing psychological treatments, including insight-oriented, behavior-modifying, and supportive psychotherapy, interactive psychotherapy, family psychotherapy, biofeedback, behavior modification, and cognitive behavior therapy. These codes are typically used by clinical psychologists and psychiatrists. Research demonstrating clinical effectiveness of tinnitus treatment will facilitate reimbursement.

QUALIFICATIONS OF AUDIOLOGISTS TO DO PSYCHOLOGICAL COUNSELING

Counseling of tinnitus patients should be performed only by clinicians who have the training and professional license to do so. Flasher and Fogle (2004) suggest that audiologists can use basic psychological principles and techniques for which they have knowledge. Clearly, patients who have clinical depression, anxiety disorders, or other psychiatric ailments demand appropriate referrals. This does not mean that audiologists cannot be involved in treating the tinnitus in these cases, however. In my experience, psychiatrists and psychologists often welcome a collaborative effort with an audiologist who has experience in treating tinnitus. Treating tinnitus patients requires a commitment, a plan, and some clinical expertise. You are likely committed if you are reading this book, and if you do
not have a plan, this book will offer several options. Clinical expertise comes from training, experience, and certain personal characteristics that can be learned and are often facilitated by personal supervision of real clinical experience. Some of the desirable characteristics are as follows (after Flasher and Fogle, 2004; Gladding, 2000; Riley, 2002):

- Ability to listen
- Patience
- Ability to be encouraging to the patient
- Ability to talk candidly about depression, anxiety, and other psychological problems
- Emotional insightfulness
- Self-awareness
- Ability to laugh at the bittersweet aspects of life
- Positive self-esteem
- Emotional stability

Conclusion

Counseling and sound therapy are the fundamental treatments for tinnitus. There are many counseling options, and most include providing information on hearing loss, tinnitus, and attention. Differences exist on how much time to spend on each area, but this is a secondary issue. I believe that counseling should consider the individual’s emotional state and focus on providing coping strategies. I think audiologists can learn more from aspects of cognitive and behavioral therapy as they are applied to other problems. A greater emphasis should be placed on improving sleep. Some patients may benefit from systematic therapies covering concentration and relaxation, but these can be offered as optional. The detailed comprehensive therapy plans provided by Henry and Wilson (2001, 2002) are important contributions and supplement the comprehensive therapy protocols of Hallam (1989), Slater and Terry (1987), and Davis (1995). The chapters in this book demonstrate varied approaches to counseling.

Sound therapy, involving wearable and nonwearable devices, should be considered an option for most tinnitus patients. Providing background sound removes some of the annoying characteristics of a piercing tinnitus. I believe that total and partial masking therapies with a focus on the mixing point do help some patients, but for many the resulting background noise levels are too intense. Lower levels of partial masking generally are more acceptable. Also, many patients do not want to listen to any levels of noise, and attempts to force sound therapy on them can be counterproductive. Finally, the use of music and other types of nonrandom noise in treating tinnitus should be explored.

Acknowledgments

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Tinnitus is a disorder where the degree of distress caused by the symptoms depends to a large extent on the amount of worrying and attention that the person devotes to it. A vicious cycle results, the anxiety and overattention leading to mental and physical tension, which in turn causes the auditory centers in the brain to increase their selectivity for seemingly important or threatening sounds, such as the tinnitus. That then causes more anxiety, and so on. This cycle, however, usually can be broken and reversed, either as a result of appropriate counseling or due to the gradual spontaneous process of habituation to an ongoing sensation.

Almost any tinnitus counseling that explains the condition and allays some of the anxiety while suggesting improvement is possible will enhance the treatment.

Explanatory counseling, together with “patient expectation nurturing,” a term first used by Tyler (1999) for nurturing the expectation of improvement and further elaborated by Tyler et al (2001), will help most patients with tinnitus (see also Roberts et al, 1993). In a small group of patients, the tinnitus may disappear entirely. However, this should not be held out as the aim of treatment because it will only lead to disappointment for most. Instead, the target for treatment is for the tinnitus to become something that is little or no trouble, although still there and audible to the patient when listened for. Although nearly all people with tinnitus will eventually achieve this spontaneously, many can be speeded on their way by appropriate counseling. Even those who are severely affected often can be helped.

Purpose of Self-Treatment Brochure

We feel that a brochure detailing self-treatment information can help tinnitus patients either as a reinforcement of or an extension of the advice given them by professionals: family physicians, otologists, audiologists, hearing therapists, and clinical psychologists. It also helps to update those professionals who are
not especially interested in or concerned with tinnitus. Our brochure aims to impart

- The essential underlying counseling principles, together with advice on the additional benefits that result from sound reinforcement or enrichment
- Reassurance about the lack of a serious cause (subject to a medical examination)
- Some form of explanation as to how the tinnitus has arisen and that worrying will prolong it or make it worse
- A statement that relief will gradually come from understanding it and putting it in its rightful unimportant place
- The nurturing of an expectation of gradual relief

The presentation of low levels of background sound is also recommended for the quiet times of day or night, including when asleep, and is delivered by wearable noise generators and/or environmental or bedside sound sources.

Within the United Kingdom, this brochure, together with a similar one, *Tinnitus Explained* from the Hull Tinnitus Group (www.tinnitusexplained.org), has proved very popular with both audiological professionals and self-help groups. Its main text, slightly modified for the international nature of this book, is reproduced following here. We have no personal or copyright objections to all or parts of it being copied, with local details inserted. However, we would request that such use be acknowledged in any new leaflet and that we be sent a copy of it.

**Text of a Tinnitus Self-Treatment Brochure**

*If you have tinnitus, you should be able to get a very worthwhile degree of relief with the approaches suggested in this brochure. This self-treatment can be done either before or after seeking professional advice. However, we recommend that you visit an otologist or audiologist to reassure you that there is no underlying health condition causing the tinnitus for you to worry about. If you are not reassured, you could ask to be referred to a hospital or specialist to make sure. It is possible that you may have to wait for an appointment—so why not start to help yourself manage your tinnitus now?*

*By following the advice in these notes, you can actually treat your tinnitus yourself and possibly achieve a gradual reduction of tinnitus to something that will eventually no longer matter much or at all.*

**What Is Tinnitus?**

*Tinnitus is the experience of hearing a sound coming from within one or both of your ears, or your head. It is often described as a ringing, buzzing, or whistling noise. It is usually due to a minor disorder of your hearing system and is often associated with aging or exposure to loud noise. It is a symptom, not a disease.*

*Although tinnitus can sometimes be very distressing, it is usually not life-threatening, and the quality of your life can be recovered. You may not be able to get rid of your tinnitus noise completely, but you can gradually reduce or eliminate the way tinnitus affects you, so that you hardly notice it. Most people who are upset by their tinnitus learn to manage it through doing things for themselves to improve their tinnitus. However, it may take several months—this is quite normal, so don’t feel disheartened.*
Your Hearing System

When you hear outside sounds, those sounds travel in waves in the air and are converted by your inner ear (cochlea) into nerve signals that are like tiny electrical currents. These signals pass up your hearing nerve to the base of your brain. Your brain then sorts out what is immediately important. It usually ignores meaningless sounds, and it can learn to do the same with the internal sound of your tinnitus.

We can distinguish particular sounds in a great hubbub of other sounds. For example, most people can probably pick out the sound of their name uttered by someone in a room of chattering people and can detect a single musical instrument in a full orchestra. Unfortunately, many people with tinnitus tend to do this with their tinnitus when it starts—we naturally home in on that new, unfamiliar, and unwanted noise.

SELECTIVITY AND ATTENTION

Your hearing system has an automatic property of selectivity. That is, parts of the hearing system within your brain increase the degree to which they select out certain important, strange, or worrying sounds (including tinnitus) for special attention, and filter out the hearing of other sounds. Also, as you get older, your ability to hear external sounds reduces, and the resulting lack of contrasting sound makes you become more aware of internal tinnitus noises. Any other form of hearing disorder or damage, such as from repeated exposure to loud noise (for example, gunshots, noise at work, or very loud music), can add to this natural hearing loss and make tinnitus even more noticeable.

HABITUATION

Imagine you have a new clock. At first you can’t help but hear its ticking, but after a while you find you are no longer aware of it. Other people hearing your new clock for the first time say how loud it is, but you have habituated to it—you are no longer conscious of it, your brain has decided to stop monitoring its constant, meaningless, nonthreatening ticking. This is a natural process, called habituation, that your brain uses to stop overloading itself with the need to monitor all sorts of harmless information—and that applies to tinnitus too.

Tinnitus naturally subsides over time. It isn’t a progressive condition that gets worse the longer you have it or the older and more hard of hearing you become—it’s quite the opposite! But you can do things to speed up this habituation process, and to alleviate some of the effects tinnitus causes until it does subside.

Anxiety, Tension, and Learning How to Relax

It is very common to worry about tinnitus and for this to cause tension, so learning how to relax is part of the relief process. Tinnitus often creates a vicious cycle of tension and worry that keeps the tinnitus worse than it could be; Fig. 2–1 shows how this works.

But you can break this cycle! If you break it, the chain of events will reverse.

As a first step, read these notes again to make sure that you understand how worrying about your tinnitus and constantly listening to it will feed this vicious cycle. Monitoring your tinnitus and worrying about it will only make it worse.
To help relieve the tension in your body, you can use simple relaxation exercises that involve training your body to relax. You can read about such exercises in books, listen to them on audiotapes, or often best learn how to do them at relaxation exercise classes, whichever you prefer. Your local or national tinnitus self-help association can tell you about relaxation tapes. For example, the American Tinnitus Association (www.ata.org) and the British Tinnitus Association (www.tinnitus.org.uk).

Here are some simple examples of relaxation exercises.

1. Find a comfortable position, and breathe in slowly and clench your fist. Feel the tension in your hand and wrist. Now breathe out, and as you do so relax your hand and feel the difference. You can extend this to other parts of your body, such as your other hand, each arm, leg, and foot, your back and neck, face movements, and jaw clenching.

2. Breathe slowly and deeply, hold your breath a moment, relax, then let it out, wait a moment, then breathe slowly and deeply again, and so on.

Once you have learned such breathing and muscle relaxation exercises, you can do them regularly, wherever and whenever you can find the time and space. It will take a bit of practice, but you should quickly start to feel the benefits, and you will gradually learn how to relax your body without having to do the exercises. As you learn to relax your body, you will also find it easier to relax your mind.

Some people find that aromatherapy, improved posture, massage, reflexology, craniosacral therapy, yoga, and tai chi have similar relaxing benefits, as can simply resting in a relaxing environment, perhaps with special aromas, dim lights, and soft music. The key is to find what helps you relax the most and easiest, then practice it often.

Sound Therapy

The normal natural history of tinnitus is for it to gradually recede into the background so that you eventually become hardly aware of it—the habituation process described earlier.
You can speed up this process by increasing the amount of background sound near you, what some audiologists call “sound therapy.” This reduces the contrast between the level of your tinnitus and the level of background sound. In turn, this reduces the intrusiveness of your tinnitus and the tension it causes, thus promoting the habituation process and interrupting the vicious cycle described above. The principles and procedures involved are similar to those used in most forms of sound therapy.

Additional background sounds can come from:

- Pleasant low-level sounds from a television, radio, or recorded music, from a fan, or from outside through an open window.
- Sound conditioners—bedside, chairside, or tabletop devices that play natural sounds (such as the sound of gentle waves, the rain, or a stream), or “white” noise (a continuous “shhh”-like sound)
- A wearable noise generator—a device that looks like and is worn like a hearing aid, but which makes its own “shhh” sound
- Wearing and using a hearing aid, even if you have only slight difficulty in hearing

Exactly what is the best level of additional sound to use has not yet been established, but a level just below that of your tinnitus would seem sensible—not too loud so you can’t hear your tinnitus, but not very soft either. However, if that is too loud for you, then use the loudest level you can put up with. But if you want to use more noise and drown out (mask) your tinnitus, do so if you find it suits you.

The key is to avoid quiet, or remove it. In the quiet your brain will try to hear any sound more clearly, and that will include the sound of your tinnitus. You should reinforce your background sound whenever the background is rather quiet, as often and for as long as you can.

If increasing background sound annoys other people around you, use a personal music player and headphones. You may find that using rechargeable batteries saves money, and that using “in-ear” earphones delivers the sound into your ears better than headphones.

Most importantly, you also need sound therapy in bed, whether asleep or awake. It is particularly harmful if you lie in the quiet of the night listening to your tinnitus when you can’t get to sleep, or when you wake up during the night. You could try sleeping with the window open, or have a gently ticking clock in your room, or use an under-pillow speaker or sound pillow attached to the sound source of your choice. You are less likely to disturb others this way.

**Recreation and Health**

Having active interests and hobbies can enhance the quality of your life. They can put your tinnitus into a better perspective so you can still enjoy life to the full. It’s never too late to learn or to get involved, so look through those adult education brochures!

Some people have seen the positive side of their tinnitus and have welcomed the push it gave them to do something new, to rekindle old interests, or to take on the challenge of working for a tinnitus support group.

How is your general health? Are you getting a good, varied diet, plenty of exercise and rest, and some enjoyable social activity? If you find that certain foods or drinks, or activities or situations aggravate your tinnitus, you could cut down a little, cut them out, or find alternatives. With just a few adjustments you will find that tinnitus won’t stop you carrying on with life the way you want to.
Hyperacusis (pronounced hyper-a-KOO-sis)

This means a condition of oversensitivity to loud sounds, even moderately loud sounds. It is found in many people with troublesome tinnitus and might be caused by a similar brain mechanism. Like tinnitus, hyperacusis can usually be improved using sound therapy procedures already described, although for hyperacusis the level of added sound is gradually increased, step by step, over a period of weeks or months. This treatment process is called “desensitization.”

Earplugs

If you have tinnitus, you should not wear any kind of earplugs that make it more difficult to hear, except when you are in a very loud noise. They will not help your tinnitus: indeed, they will probably make it seem louder while you wear them. Generally, it is not a good idea to wear earplugs if you have hyperacusis (unless you are using earplugs temporarily in a noise that is unbearably loud to you) as they can prevent your ears from getting accustomed to sounds. On the other hand, you should always use ear protection when you are exposed to very loud sounds, whether or not you have tinnitus or hyperacusis.

Temporary Deafness and Temporary Tinnitus

If you have been exposed to a particularly loud sound, for example, a disco or fireworks or working around loud noise, you may often experience dullness of hearing or tinnitus, or both, immediately afterwards. Provided you don’t let yourself get into a state of great anxiety about it, this will usually disappear after a few minutes or hours. These temporary effects should be taken as a warning, though—there is a risk of permanent damage if you expose your ears repeatedly to such loud sounds.

Further Information and Help

With this insight into tinnitus, you may feel you can now learn to ignore yours. If you want to know more about tinnitus, contact your local or national tinnitus self-help organization. These can provide further information, advice, and support.

Acknowledgments

We gratefully acknowledge much assistance in the preparation of this brochure from nurse-tutor Alison Clark as well as Bill Howard of the Hull Tinnitus Group.

References

Internet-Based Self-Help Treatment of Tinnitus

Gerhard Andersson and Viktor Kaldo

This chapter presents a novel approach to tinnitus management with a cognitive-behavioral treatment protocol implemented via the Internet. Self-help in the management of tinnitus is reviewed, as well as practical aspects of the protocol. These include adherence, security, and technical problems. Effects of the protocol are briefly mentioned.

Background

Self-Help Material for Tinnitus

The self-help books industry is a growing market, and many people with debilitating conditions never seek professional help. It is therefore not surprising that people attempt to treat themselves without the involvement of health care professionals and hospital facilities. In addition, many people read self-help books at the same time as they are in treatment. This can be a recommendation from the therapist or resulting from pure interest. A survey of practicing psychotherapists revealed that over 80% were recommending self-help resources to their clients (Norcross et al, 2000). In addition, self-administrated treatments do rarely result in any negative outcome (2–3%), at least not more than in regular treatment (Scogin et al, 1996). For all parts involved, cost effectiveness is an important aspect of the health service provided. A way to reduce the costs is therefore to minimize contact with the therapist and to let patients treat themselves, supported by books and structured self-help manuals. Tinnitus is a good example of a prevalent condition where the need for self-help is great. First, many tinnitus patients never get to see a professional tinnitus clinician. Second, only a few patients need to go through an extensive therapy program, and many benefit from learning more about their condition and how to deal with it on their own.
For many conditions such as headache, sleep problems, and anxiety there is empirical support for the use of self-help materials (often referred to as bibliotherapy). Self-help books can be a good alternative when professional therapy is inaccessible or considered too expensive. Although numerous books exist on the market only a fraction of these have been tested in empirical studies (Norcross et al, 2000). A list of commonly used and researched self-help books, relevant for the tinnitus clinician, is presented in Table 3–1.

Usually, studies of so-called self-help treatments have included some form of contact with the therapist; for example, by means of telephone calls. Hence a more proper name is minimal therapist contact treatment. Although many tinnitus sufferers seek help outside of health care settings (e.g., the Internet), clinicians have paid little attention to the idea of alleviating tinnitus via self-help material. However, self-help groups are often set up, and years of experience confirm their usefulness (Reich, 2000).

In many countries, information brochures on tinnitus are available. These are often issued by national societies, as, for example, by the Swedish Hard of Hearing Association, the American Tinnitus Association, and the Royal National Institute for Deaf People. Alternatively, folders are produced and distributed by local clinics in the form of photocopied handouts.

Several books have been published on tinnitus, and some have been aimed at a broader audience than researchers and clinicians. Moreover, the national tinnitus organizations have been instrumental in spreading information regarding tinnitus and its treatment. It is beyond the scope of this chapter to review all of the abundant literature and information on tinnitus, so we will comment on just a few examples.

Regarding psychological management of treatment, an influential book was published in 1989 by the psychologist Richard Hallam (Hallam, 1989). This book has been translated into at least two other languages (Swedish and German) and includes good advice. Most of its content is still relevant today, but perhaps the section on masking therapy has been outdated by the passage of time and the recent development of our understanding of masking as a treatment for tinnitus. Davis (1995) published a self-help book, Living with Tinnitus, that includes good advice. The format of this book makes it highly accessible to most patients and a good start for those who want to learn more about the

<table>
<thead>
<tr>
<th>Condition</th>
<th>Book</th>
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<tbody>
<tr>
<td>Depression</td>
<td>Burns, DD Feeling good: The New Mood Therapy: Revised and Updated. New York: Avon; 1999</td>
</tr>
<tr>
<td>Panic disorder</td>
<td>Zuercher-White E. An End to Panic: Breakthrough Techniques for Overcoming Panic Disorder. 2nd ed. Oakland, CA: New Harbinger; 1998</td>
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condition. More recently, Henry and Wilson (2002) published a self-help book, *Tinnitus: A Self-Management Guide for the Ringing in Your Ears*, in which their cognitive-behavioral treatment approach is made accessible in the self-help format. There are also books available that contain more specialized information, basically reviewing research (e.g., Vernon, 1998). Among these are Sheppard and Hawkridge’s *Tinnitus: Learning to Live with It* (1987). Finally, we have more advanced material in the form of books for professionals (e.g., Tyler, 2000). We all know that many patients are well educated and have no problem following the scientific literature. Nonetheless, some choose not to, and of course there are plenty of patients for whom it is impossible to grasp the scientific literature.

It is clear that information on tinnitus is abundant. However, from the scientific literature we know that self-help on its own rarely is effective, and that some form of guidance, however small, must be provided. In this chapter we will describe our experiences with a self-help program for tinnitus, and in particular we will focus on how self-help can be implemented via the Internet.

**Self-Help Material for Tinnitus on the Internet**

The Internet has dramatically changed access to information and the spread of such information worldwide. It has become a regular part of many people’s lives, including in the use of the Internet in seeking health care advice and assistance. In fact, health care information is said to be one of the most retrieved types of information on the World Wide Web (Eysenbach et al, 1999). As the amount of medical information on the Internet has grown rapidly, concerns have been raised that the material needs to be filtered (Eysenbach and Diepgen, 1998), and that some form of quality control is needed. For example, patients often turn to the Internet to confirm diagnoses, validate clinician-recommended treatment, and seek alternative therapies (Bader and Braude, 1998). In addition, clinicians use the Internet to communicate with their patients (Kuppersmith, 1999), a practice to which there are advantages as well as potential problems. Moreover, through telemedicine, several interesting applications of the Internet have been developed (Mair and Whitten, 2000).

The Internet revolution has led to the production of several Web pages dealing with tinnitus. Although important information can be accessed that way, there is no quality control (Eysenbach and Diepgen, 1998), and it is easy to be misled.

**Internet-Based Self-Help**

One potential way to provide self-help material in a structured manner is via the Internet. Providing treatment via the Internet has advantages over self-help books in that advice can be given on an ongoing basis without delay. In comparison with ordinary treatment, Internet-based self-help treatment can be cost effective; it also makes the treatment available to people living far from the specialist’s practice.

We have developed a clinical program in which self-help is investigated for various conditions (e.g., Carlbring et al, 2001; Ström et al, 2000), including tinnitus (Andersson et al, 2002; Kaldo et al, 2004). The approach involves therapist interaction either via e-mail or supplemented with telephone calls, and all treatment is based on cognitive-behavioral principles. The main difference from
previous self-help studies is that in Internet-based self-help treatment, all material is provided via Web pages. As we will return to later in this chapter, we have also developed a tinnitus treatment, largely based on the protocol described in Chapter 8. This is the program we have had the most clinical experience with in our audiology clinic in Uppsala, Sweden.

Necessary Background and Facilities

All patients need to have access to computer, modem, and Internet connections, and should be able to print out the training instructions. The intention is to make the treatment instructions easily available (technically easy), and computer experience is probed during the structured interview. However, some people may have access to a computer but not one of their own. Because privacy may be an important factor, this issue should be discussed with the patient. In the treatment rationale, the role of the Internet actually needs to be deemphasized because the content of the treatment could very well be presented in a book. However, the interactive part of the Internet should be put forward as an advantage. We require that patients go through a proper medical and audiological screening before they start treatment. The Web pages are not “open,” and are accessible only with a password, given by e-mail to the patient. In cases when the Internet fails to work, or when patients have problems with their connection, the possibility to contact us over the phone is given. It is perfectly possible to go through all the steps without any personal contact, but in clinical practice we see the patient for a first assessment session, and preferably for a follow-up. However, all registration forms and rating scales have been converted into Web pages and are filled out via the Internet.

The Protocol

As mentioned, the Internet self-help treatment is basically a translation of our regular treatment protocol but with certain alterations due to the format. The first open pages include information about tinnitus (see Table 3–2), what is required to follow the program, an overview of the treatment program, and a special page for referring authorities. Then, links to the assessment page and treatment pages are given. These require passwords, which we mail to the patients.

### TABLE 3–2  Home Web Page Contents

<table>
<thead>
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<th>Definition of tinnitus</th>
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<tr>
<td>What we know about tinnitus</td>
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<td>Causes and related factors</td>
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<tr>
<td>More on hearing impairment</td>
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<tr>
<td>Other causes and related factors</td>
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<tr>
<td>Otosclerosis</td>
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<tr>
<td>Tinnitus and normal hearing</td>
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<tr>
<td>Tinnitus and psychology</td>
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Internet treatment should not be seen as a substitute, but rather as a complement to tinnitus management at the home clinic. However, because few psychologists are involved in tinnitus rehabilitation (Coles, 1992), self-help represents a promising alternative in combination with other forms of management.

The whole process from referral to completed treatment is outlined in Figs. 3–1, 3–2, and 3–3. In our clinic we conduct a structured interview with each patient before Internet treatment is started.

HOW TO FOSTER ADHERENCE

The implementation of the Uppsala treatment program via the Internet has been possible without any major revisions. However, certain practical aspects must be detailed to avoid misunderstanding the purpose of Internet-based self-help treatment of tinnitus. Self-help treatment is not a quick fix, and it does not consist only of information. Patients should be aware of the fact that they need to devote at least 30 to 45 minutes per day to the treatment exercises. In order for the program to have any effect, it is crucial that the patients go through the exercises and that they e-mail us if there are any questions or technical problems. The program is set up in six modules that basically mirror our face-to-face treatment. All modules involve homework assignments and reports on a Web page to be submitted weekly. Patients are encouraged to ask questions regarding the treatment, and all queries are answered as promptly as possible by the therapist or the physician. When submitting a weekly report, the patient is sent an e-mail with feedback on treatment progress, focusing on the positive aspects. Moreover, misconceptions about immediate treatment effects and (for some patients) a desire to adhere too strictly to the instructions given are sorted out. For example, patients may believe that the treatment will not be of any help if they are unable to practice as many times as instructed. Another use of e-mail feedback is to help patients go through the treatment within a reasonable amount of time. Some may need to be encouraged to fill in the diary and to move on to the next module. The code for each consecutive module is given automatically.

THE MODULES

A rationale is presented for each component of the treatment. In this section we will comment on the treatment modules as they are presented on the Web pages.
Figure 3–2  Treatment Web pages for 6 weeks.
First Week  A treatment rationale is presented, including psychological mechanisms and how they may affect tinnitus (see Chapter 8). An example of a vicious cycle is given (see Fig. 3–4). Applied relaxation step 1, Progressive relaxation (tense and release body parts), is presented in the text version. A potential disadvantage of Internet-administered relaxation training is that we have no way to observe if the relaxing is practiced properly. Hence, homework compliance and weekly report cards of progress are very important to monitor patients’ progress and to encourage them to send in any questions they may have. Potential problems with relaxation are covered.

Second Week  Information and instructions are given regarding the next topic, “Tinnitus and environmental sounds and use of environmental sound enrichment strategies for facilitation of habituation to tinnitus.” In this text we describe the purpose of using sounds to deal with tinnitus. Also presented are tips regarding which sounds to be used. In this information the role of sudden changes, or contrasts, is explained, and it is suggested that sudden changes in background sound (e.g., from music to silence) are likely to increase the salience of tinnitus. However, although annoying, this contrast effect is not dangerous and is not a sign that tinnitus loudness has increased permanently. Regarding which sounds to use, the most important thing is that they should not be too loud. They may vary in terms of attention-grabbing properties (interest). For example, often a meaningless background sound (e.g., traffic from the street) is good when the patient is concentrating on other things, but there are also situations for which an interesting sound (e.g., a radio program) is preferable. Applied relaxation step 2, Release-only relaxation without tension, is presented in text. Release-only relaxation is given as homework for the next week.

Figure 3–4 Example of vicious cycle.
Third Week  Applied relaxation step 3, Cue-controlled relaxation (controlled breathing), is presented. Because the Internet administration allows a flexible approach to what information to present, the patient can easily be given information about possible obstacles and problems when practicing relaxation. Instruction on how to use imagery techniques (i.e., positive imagery) is included in association with the relaxation. Also provided is advice regarding insomnia and suggestions for homework regarding sleep (Morin, 1996). Hearing tactics (Andersson, 2000) are not only for the individual with hearing problems but also directed to the people close to the patient.

Fourth Week  Applied relaxation step 4, Rapid relaxation in everyday situations, is introduced, and the patient is encouraged to establish rapid relaxation as a habit. Common for all the steps in applied relaxation is that the Internet administration has been unproblematic. In other words, patients find it fairly easy to learn relaxation via the Internet. Information on attention-shifting techniques is included. For example, patients are given exercises on how to shift attention from tinnitus to other sounds, or from tinnitus to other bodily sensations or positive images. The cognitive therapy part of our self-help program begins by presenting a repetition of the treatment rationale and by explaining the "situation-cognition-emotion" perspective of understanding tinnitus distress. Also introduced are common cognitive "errors" (e.g., overgeneralization) and ways to find alternatives to negative automatic thoughts (see Henry and Wilson, 2002). Being a text-based self-help approach, this demands that the information is clear and that patients can reach us via e-mail to sort out questions and misunderstandings.

Fifth Week  Repetition of the relaxation exercise (step 4) and application in different situations are encouraged on the basis of self-report of practice and use. Information on hyperacusis is presented, with a report card included. Techniques such as reinterpretation of tinnitus and gradual exposure to tinnitus/quiet environments are presented. We also give advice on how to minimize concentration difficulties. This includes structure of encoding and ways to facilitate retrieval from memory.

Sixth Week  Apart from the relaxation training, this last module includes planning of when to use the exercises in the future. Another aspect of the treatment that is highly suitable for Internet use is the prevention of lapses (see Henry and Wilson, 2002). Regular physical exercise is seen as a protective factor for preventing relapse. Questionnaires for follow-up assessments are administered. In addition, after the treatment, the Web pages are available for patients as an extra way to prevent relapse.

Special Considerations

Obviously, self-help via the Internet cannot be equated with ordinary treatment at a clinic, and it is not suitable for all people. There are also other, more subtle
matters to consider when implementing Internet-based treatment. One example is the role of simultaneous treatments that may have a totally different rationale. In general, we rarely regard this as a problem, but one plausible reason may be that our Internet treatment is regarded as something less real than seeing a therapist at an office. Interestingly, when we have studied this question empirically using the treatment credibility questionnaire (Borkovec and Nau, 1972), we have found no differences in perceived credibility between our ordinary treatments (group or individual) and Internet treatment.

Critics may question whether cognitive therapy really can be given over the Internet. There is empirical evidence that suggests that cognitive therapy in the form of self-help books has beneficial effects on several conditions (Norcross et al, 2000). We see no reason why Internet administration should be less effective.

What might be critical from a research point of view are placebo effects. It may be that we convey a sense of being cared for (access to contact on a continuous basis), and that patient expectations are nurtured and enhanced by the medium. There is indeed something special with the Internet, and we have seen this in several of our studies. However, the attraction of the Internet can also lead to its misuse in that the “surfer” is tempted to go and check the latest news instead of doing relaxation training. There have been reports on pathological Internet use (Griffiths, 1998), but so far we have not seen this in our clinic.

The Internet brings with it numerous possibilities. For example, in the clinic we have built-in reminders for the clinician when it is time to contact the patient; such reminders are being developed for our self-help Web pages. Also, rating scales for each of the therapy components are being developed that are more detailed. By making the homepage more interactive, we also hope to increase patient participation by letting patients plan and tailor their treatment to a greater extent.

Potential Problems and Evaluation of Effects

DISINHIBITION AND THE INTERNET

A tendency for Internet users to be disinhibited has been observed (Joinson, 1998), and it may be that it is easier to send an e-mail than it is to seek treatment via traditional routes. Moreover, it has been suggested that Internet-mediated communication is less inhibited by social norms and that this can result in misunderstandings. One suggested reason for this is that Internet communication (i.e., e-mail) lacks many of the emotional cues provided by spoken language, while still being a “rapid” form of communication without the time to reflect upon answers and comments given. However, in our clinical practice we have not yet experienced this as a problem, and it is important to remember that Internet-based treatment does not preclude telephone contact or correspondence by letter either. Also, although the Internet certainly encourages rapid responses, the practicing clinician does have the possibility to reflect and even consult colleagues before responding to the patients’ questions.

DROPOUTS OR SLOW RESPONDERS?

Perhaps because of the nature of the Internet, and because of selective recruitment in our first controlled trial, we had problems with what we first thought were
dropouts from the treatment. Later this turned out to be problems caused by lack of time. In the clinic it will be immediately apparent if patients decline treatment because of time constraints. Interestingly, when implementing the Internet-based treatment in clinical practice, we have found a higher adherence to the treatment by those patients who have been referred from counties outside of our own. Most likely this is explained by their efforts in getting a referral from their home counties (which often is restricted). Compliance to Internet-based treatments is an area for future research.

SECURITY AND TECHNICAL PROBLEMS

As the Internet is increasingly used and technology is improved, issues regarding security become less difficult to solve. However, for now there is no guarantee for protection against intrusion. Rarely, if ever, is this mentioned as a problem by our patients. However, security matters should be discussed with patients, particularly if they share a computer (or an e-mail account) with family members. Clearly, problems need not arise if this is discussed before treatment. For example, personal feedback can be sent via regular mail, or the patient and the therapist can agree to leave out certain sensitive matters when corresponding via e-mail, and instead discuss them over the phone or in session.

Because we see all of our patients in a first assessment session, the risk of faked responses is decreased in comparison with our controlled trial in which participants could remain anonymous. However, unrealistic responses on questionnaires and noncompliance (while still sending in homework assignments) cannot be detected in a reliable manner. This problem also pertains to paper-and-pencil evaluations.

SOLICITED AND UNSOLICITED E-MAIL CORRESPONDENCE

E-mail is often used to send in questions to professionals (Kuppersmith, 1999). Each clinician runs the risk of being overloaded with both solicited (from patients in treatment) and unsolicited (from patients not in treatment) e-mails. Eysenbach and Diepgen (1999) did a study of 209 unsolicited e-mails mostly sent to physicians by individuals seeking advice for dermatological problems. They found that 81% of correspondents had a chronic disease and sought a second opinion. Moreover, the researchers found that 40% of all e-mails could have been answered by a librarian, 28% of all e-mails were judged to be suitable to be answered by a physician via e-mail alone, and in 27% any kind of consultation would not have been possible without seeing the patient. They concluded that e-mails could substitute a physician visit or telephone call in some cases, but that some major problems need to be solved beforehand.

In clinical practice, we need to focus on the patients who are in treatment and be careful when responding to unsolicited e-mails.

Conclusion

Access to the Internet is increasing, and many people use it to access health-related information. It is also becoming an accepted medium for clinician–patient interaction. The Internet is widely used by tinnitus patients to access information regarding their condition, as attested by the numerous Web pages dealing with the condition.
Most likely, the Internet will change the way health care is provided in the future; hence, there is an urgent need to evaluate the pros and cons of Internet-based treatment. Given the novelty of the medium, there are several issues that evolve when conducting treatment via the Internet, such as ways of recruitment, participant characteristics, and online behavior, that may differ from in-session treatments.

It is necessary to develop and test self-help approaches for the management of tinnitus. The vast majority of Web sites and self-help books have not been evaluated empirically, and it is very likely that much self-help material can be used as an adjunct to the care provided at the clinic. The Internet is promising in its capacity to reach many people at a long distance and at a low cost.

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Treating Tinnitus in Patients with Otologic Conditions

David M. Baguley, Catriona A. Williamson, and David A. Moffat

In this chapter we share our perspective on treating patients with tinnitus in whom otologic pathology has been diagnosed, and the tinnitus therapy must be interleaved with the treatment of the causative condition. This is of particular importance where the treatment may exacerbate tinnitus. As will be discussed in detail here, treatment of Meniere’s disease with gentamicin ablation therapy carries a risk of both increased hearing loss and more intense tinnitus, as does the translabyrinthine removal of a vestibular schwannoma. Tinnitus treatment that is integrated within the overall treatment has an increased likelihood of success.

Also implicit within this model is the idea of a multidisciplinary team. The utility of surgical teamwork and collaboration is well established within neuro-otology, but in the case of tinnitus therapy, the medical team must expand to include the tinnitus therapist, of whatever discipline. The perspectives brought by each individual from his or her own discipline will be invaluable, and it is in such multidisciplinary collaborative models that hope lies for new and effective treatments of tinnitus.

Tinnitus treatment protocols in three specific otologic conditions are described: Meniere’s disease, vestibular schwannoma, and unilateral sudden sensorineural hearing loss.

Although the treatment approaches to patients with these conditions are described in specific detail, there are insights that will assist the reader in treating patients with other otologic conditions with which tinnitus is associated.

Treating Tinnitus in Patients with Meniere’s Disease

Tinnitus is a defining feature of Meniere’s disease, the others being episodic rotary vertigo and hearing loss (AAO-HNS, 1995). There are some indications that patients with Meniere’s disease have specific tinnitus experiences. Stouffer and
Tyler (1990) noted that patients with Meniere’s disease had significantly higher ratings of tinnitus severity and annoyance than patients with other etiologies. Douek and Reid (1968) found that patients with tinnitus as a symptom of Meniere’s disease consistently matched their tinnitus to a low-frequency tone (usually in the range 125–250 Hz), unlike the majority of tinnitus patients, who match tinnitus to a pitch above 3000 Hz (Tyler, 2000). Erlandsson et al (1996) noted that those patients with anxiety and depression associated with Meniere’s disease found their tinnitus intolerable. The finding that patients with Meniere’s disease consider the impact of their symptoms more severe if they are anxious or depressed will not surprise those clinicians who see such patients, and a screen for treatable anxiety or depression, such as the Hospital Anxiety and Depression Scale (HADS; Zigmond and Snaith, 1983), should be considered.

A therapeutic strategy for tinnitus in Meniere’s disease should account for these specific issues. The combination of tinnitus and hearing loss should cause one to consider amplification, with a prescription that is mindful of both potential hearing fluctuation and loudness recruitment. Although the hearing loss will be unilateral in the majority of cases, and thus may not fall within some traditional amplification protocols, there is qualitative and quantitative evidence that mild unilateral hearing loss may be associated with hearing handicap (Harford and Barry, 1965; Newman et al, 1997).

Medical and surgical treatments for Meniere’s disease have the aim of vertigo control, and may have a risk of exacerbating tinnitus and hearing loss. Vestibular nerve section has been demonstrated to remove input from a labyrinth with Meniere’s disease. The ablation of the medial efferent auditory input to a cochlea when the inferior vestibular nerve is sectioned, containing medial efferent fibers (Rasmussen, 1946), which then join the cochlear nerve at the anastomosis of Oort (1918), has a hypothetical risk to frequency selectivity and to the coding of tinnitus intensity by the efferent system. Scharf et al (1997) found, however, that the performance of 16 patients on psychoacoustic testing was not degraded following vestibular nerve section. Baguley et al (2002) have reviewed the effect of vestibular nerve section on tinnitus and found that in the majority of patients, tinnitus remains at preoperative levels or improves. The use of intratympanic gentamicin to perform a chemical labyrinthectomy for vertigo control has become widespread. Reports of the effect of this procedure on tinnitus are variable. Several authors have reported that tinnitus may improve or even abate after such treatment (Atlas and Parnes, 1999; Silverstein et al, 1999), but because the procedure involves a potential risk to cochlear function (Berryhill and Graham, 2002), one should be mindful of the possibility of tinnitus exacerbation.

A note of caution is offered by Vernon et al (1980), who reported that following the successful control of vertigo, some patients with Meniere’s disease focus more on their tinnitus and hence are more distressed by it. This is supporting evidence for the approach described herein, where tinnitus therapy is coincident with interventions for the vestibular and hearing symptoms of Meniere’s disease.

**Treatment Protocol**

There are several elements of tinnitus treatment specific to patients with Meniere’s disease, addressing the issues just described, and these are summarized in Table 4–1.
ASSOCIATION WITH VERTIGO

In many patients, increased tinnitus may be an element of the prodrome to an attack of vertigo. As such, the strong association of tinnitus with disabling rotary vertigo can be a factor in the persistence of distress and needs to be addressed in counseling. Medical or surgical treatment may reduce the incidence and severity of such attacks, but the psychological association with tinnitus may well persist beyond the physical link. As already mentioned, an observation has been made that when vertigo resolves, tinnitus may apparently worsen (Vernon et al, 1980). As such, a patient with Meniere’s disease who is vertigo free may be in urgent need of intervention for tinnitus.

SOUND THERAPY AND FLUCTUATING HEARING LOSS

The hearing loss associated with Meniere’s disease is typically unilateral and low frequency, and as such is not commonly associated with significant hearing handicap. It does, however, have significant consequences for the use of sound therapy for tinnitus. If a noise generator is to be used, one should be mindful of the fact that the lower frequency element of the noise will be attenuated in the perception of the patient, and that this may well be the frequency region where the tinnitus is matched. As such, the fitting of a device that produces sufficient energy in the low frequencies to be effective in reducing the starkness of the tinnitus is indicated. A multiprogram device, with one program producing more low-frequency noise, also may be helpful.

More commonly undertaken in our clinic is the unilateral fitting of a multiple memory hearing aid for patients with unilateral Meniere’s disease. Amplification is almost always essential in bilateral Meniere’s disease. The hearing aids fitted should be carefully programmed to the most usual audiometric configuration, and one should be mindful of the need to use appropriate compression in these patients who are likely to experience recruitment. Where there is evidence of threshold fluctuation, programs within the aid should be utilized to meet amplification needs at times of exacerbation or improvement in hearing, and the patient should be carefully instructed in their use. Additionally, instruction in speech reading, hearing tactics, and auditory training may be indicated.

### TABLE 4–1  Elements Specific to Tinnitus Treatment in Meniere’s Disease

<table>
<thead>
<tr>
<th>Specific Therapy</th>
<th>When Undertaken?</th>
</tr>
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<tbody>
<tr>
<td>Counseling regarding association between tinnitus and disabling rotary vertigo</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Fitting multiprogram hearing aid</td>
<td>Second session if appropriate</td>
</tr>
<tr>
<td>Relaxation therapy, possibly utilizing biofeedback</td>
<td>Introduce in second or third session as appropriate</td>
</tr>
<tr>
<td>Onward referral for depression and anxiety</td>
<td>If indicated by HADS score</td>
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<td>Hearing rehabilitation (speech reading, hearing tactics, auditory training)</td>
<td>Ongoing if hearing loss a significant factor</td>
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HADS, Hospital Anxiety and Depression Scale.

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HADS, Hospital Anxiety and Depression Scale.
STRESS, TINNITUS, AND MENIERE’S DISEASE

The relationships between stress, tinnitus, and Meniere’s disease are complex and require some skill on the behalf of the clinician for any given individual. Careful history taking in this regard is essential. Although progressive muscle relaxation therapy has a role, a proportion of patients may need to use biofeedback to facilitate learning to reduce chronic sympathetic autonomic arousal. Additionally, sleep hygiene tactics may be introduced as an element of relaxation therapy (McKenna, 2000).

ONWARD REFERRAL FOR DEPRESSION AND ANXIETY

Given the well-established incidence of stress and anxiety in the Meniere’s disease population, there is the possibility that these symptoms may be evident in the history taken in the tinnitus clinic, and may also have an association with tinnitus. Careful use of a screening tool such as the HADS (Bjelland et al, 2002; Zigmond and Snaith, 1983) may be useful with tinnitus patients (Andersson et al, 2003; Svedlund et al, 2002).

Treating Tinnitus in Patients with a Vestibular Schwannoma

Tinnitus is a common symptom reported in patients diagnosed with vestibular schwannoma, having been stated as being present in 73% of cases (N = 473, Moffat et al, 1998) and being the principal presenting symptom in 11%. Hypotheses regarding the generation of tinnitus by this benign tumor arising from the vestibular nerve include ephaptic coupling (cross-talk of fibers within a compressed cochlear nerve) (Moller, 1984), a cochlear lesion due to ischemia by the tumor compromising blood flow in the labyrinthine artery, which runs through the internal auditory canal, or by biochemical degradation of the cochlea (Schuknecht, 1993), and the potential dysfunction of the medial auditory efferent pathway within the inferior vestibular nerve due to compression in the internal auditory canal (Baguley et al, 2001).

Intriguingly, in many cases the tinnitus persists after surgical removal of the tumor (see Baguley et al, 2001, for a review), being persistently present in 60% of patients undergoing translabyrinthine removal. Reports indicate that this postoperative tinnitus is severe in a proportion of cases ranging from 2.5% (Baguley et al, 1992) to 6% (Andersson et al, 1997). As with preoperative tinnitus, the mechanism of postoperative tinnitus remains unclear: of the hypotheses mentioned earlier, that of ephaptic coupling could be applied to the postoperative situation because cross-talk has been demonstrated in damaged peripheral nerves (Seltzer and Devor, 1979). Tumor removal necessitates section of the inferior and superior vestibular nerves, and so efferent dysfunction will be total due to the ablation of efferent fibers within the inferior vestibular nerve. However, an argument against this representing a significant factor in tinnitus persistence is found in studies that indicate that patients undergoing successful hearing preservation surgery to remove a vestibular schwannoma are less likely to have postoperative tinnitus than those undergoing translabyrinthine surgery (Catalano and Post, 1996). When such hearing preservation surgery is successful cochlear nerve function is by definition preserved, although the hearing may be slightly
affected, but the vestibular nerve is sectioned (and thus efferent input ablated) as the tumor is removed.

Although the studies already cited have demonstrated that severely distressing tinnitus is not common following vestibular schwannoma removal, there are indications (Baguley et al, 1999) that the identification of patients with severe and distressing tinnitus preoperatively may allow therapy to commence while the patient awaits surgery (or is enrolled in a watch, wait, and rescan program), in the knowledge that in many patients tinnitus persists. It may be, however, that after diagnosis and discussion as to the intended surgical or other treatment of the tumor, the patient is able to cope better knowing the cause of the tinnitus; the flip side is that the tinnitus could be exacerbated.

The use of a questionnaire such as the Tinnitus Handicap Inventory (Newman et al, 1996, 1998) at diagnosis would allow the therapist to identify those patients in whom the tinnitus symptom is associated with significant distress and thus justifies therapy (Baguley and Andersson, 2003). In those patients in whom preoperative tinnitus abates (15–18% of patients undergoing translabyrinthine removal; Andersson et al, 1997; Baguley et al, 1992), this therapy will have made the wait for surgery more bearable. In those in whom the tinnitus persists, such therapy will facilitate habituation to tinnitus in the postoperative period. One should also be mindful of those patients who do not experience tinnitus preoperatively but do following surgery (27–35%; Andersson et al, 1997; Baguley et al, 1992). These patients should undergo careful counseling about this possibility and the need not to be alarmed if tinnitus does emerge postsurgery.

**Treatment Protocols**

In our facility, patients with vestibular schwannoma and troublesome tinnitus are seen in the tinnitus clinic after they have been seen in the neuro-otology clinic and tinnitus has been identified as a problem. Treatment elements specific to patients with a vestibular schwannoma and tinnitus are summarized in Table 4–2.

<table>
<thead>
<tr>
<th><strong>Specific Therapy</strong></th>
<th><strong>When Undertaken?</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Counseling regarding the association between the tinnitus and vestibular schwannoma and any treatment</td>
<td>Pre- and postoperative</td>
</tr>
<tr>
<td>Begin therapy at diagnosis for patients in watch, wait, scan, and rescan program</td>
<td>Appointment within 1 month of diagnosis</td>
</tr>
<tr>
<td>Fitting CROS, BICROS, transcranial CROS, and contralateral BAHA</td>
<td>Hearing aids and tinnitus and vestibular rehabilitation as indicated</td>
</tr>
<tr>
<td>Relaxation therapy (progressive muscle relaxation or biofeedback)</td>
<td>Postoperative</td>
</tr>
<tr>
<td>Hearing therapy</td>
<td>Second or third session</td>
</tr>
<tr>
<td>Onward referral for anxiety and depression</td>
<td>Ongoing as patient needs</td>
</tr>
<tr>
<td></td>
<td>If indicated by HADS score</td>
</tr>
</tbody>
</table>

BAHA, Bone Anchored Hearing Aid; BICROS, Bilateral Contralateral Routing of Sound; CROS, contralateral routing of signal; HADS, Hospital Anxiety and Depression Scale.
INFORMATION ABOUT MECHANISMS

Even if information about tinnitus is given to patients diagnosed with a vestibular schwannoma, few seem to be able to assimilate it; this is not surprising, given the impact of tumor diagnosis and a possible neurosurgical procedure. There is an opportunity to inform patients troubled by tinnitus associated with a vestibular schwannoma, either pre- or postoperatively, or a watch, wait, and rescan program of the mechanisms that may be implicated in their tinnitus experience. Preoperatively, and in the watch, wait, and rescan group, this can include discussion of cochlear involvement (either by ischemia or biochemical degradation) and, postoperatively, using phantom limb analogies. These mechanisms are briefly reviewed above and in detail elsewhere (Baguley et al, 2001). Patients with gaze-modulated tinnitus may find explanation of this phenomenon particularly beneficial, although one must acknowledge that there are many unanswered questions.

WATCH, WAIT, AND RESCAN

With the increased popularity of this strategy (Hoistad et al, 2001; Sandooram et al, 2003), specific consideration should be given to tinnitus and the need for therapy. There is a tendency for such patients not to be considered for tinnitus treatment (nor indeed for auditory or vestibular rehabilitation), though this may be very beneficial. Of specific note is that some patients in this group become very concerned about changes in tinnitus, fearing that this may signal a sudden growth in tumor volume. Moving up magnetic resonance imaging scan appointments is indicated in such situations.

SOUND ENRICHMENT IS CONTRAINDICATED

Patients who undergo a translabyrinthine removal of a vestibular schwannoma, or indeed a failed hearing preservation approach, have a permanent unilateral profound sensorineural hearing loss. As such, the often used strategy of sound enrichment from a source of low-level, continuous background noise is contraindicated because such patients will find it markedly harder to discriminate any other sound against that background. This exacerbation of hearing handicap should be avoided.

POSTOPERATIVE HYPERACUSIS

It has been noted anecdotally that patients who undergo vestibular schwannoma removal in which hearing is sacrificed in the tumor ear may experience hyperacusis in the contralateral ear in the immediate postoperative period, which then resolves. This has not been empirically verified, and indeed this would be problematic to accomplish, but an explanation may be helpful for some patients. A reasonable discussion would involve the effect on the auditory system of sudden deafferentation, and of the efferent pathways that may then be adversely affected.

CROS, BICROS (Bilateral Contralateral Routing of Sound), TRANSCRANIAL CROS, AND CONTRALATERAL BAHAs (Bone Anchored Hearing Aid)

Contralateral routing of signal (CROS) hearing aid devices offer the possibility of some awareness of sound presented to a deaf ear. Detailed protocols for the fitting
of such devices are readily available (see Dillon, 2001; Valente et al, 2002, for examples). Little evidence is available regarding the efficacy of such devices in the vestibular schwannoma patient group, though evidence is emerging that benefit may be achieved with the use of a contralateral bone-anchored hearing aid in speech discrimination in some tasks (Bosman et al, 2003; Niparko et al, 2003; Wazen et al, 2003). Even less evidence is available regarding the effect of such devices on tinnitus. Given the phantom limb analogy with tinnitus following vestibular schwannoma removal, it is possible that providing sound input that appears to derive from a deaf ear may reduce tinnitus, a potential analogy being that a visual input appearing to derive from a phantom hand reduces phantom pain (Ramachandran and Rogers-Ramachandran, 1996). Further work is needed in this area, but a trial of CROS devices in such patients may be cautiously attempted.

**Treating Tinnitus in Patients with Unilateral Sudden Sensorineural Hearing Loss**

A sudden sensorineural hearing loss is considered to be an otologic emergency (Arts, 1998; Hughes, 1998) and necessitates urgent treatment. Little attention has been paid, however, to the consequence to the patient of a sudden sensorineural hearing loss in terms of tinnitus handicap.

The perceived hearing handicap of patients with unilateral hearing loss has been considered (Newman et al, 1997). A series of 43 patients with unilaterally normal hearing completed the Hearing Handicap Inventory for Adults (Newman et al, 1990). It was noted that almost three quarters (73%) reported mild or greater hearing handicap, which was indicative of “communication and psychosocial problems,” despite the normal contralateral ear. The patients were recruited from otolaryngology outpatients, but it was not recorded how long the patients had experienced the unilateral hearing loss, or if the loss had been gradual or sudden. It might be expected that the sudden and possibly traumatic onset of a unilateral hearing loss involves more handicap than a loss of insidious onset.

A more recent study (Chiossoine-Kerdel et al, 2000) investigated the tinnitus handicap associated with sudden sensorineural hearing loss in a group of patients utilizing the Hearing Handicap Inventory for Adults and the Tinnitus Handicap Inventory as outcome measures. Tinnitus was reported by 14 of the 21 patients who responded to the mailed questionnaires from a total of 38 patients identified as having undergone a sudden sensorineural hearing loss in the years 1988 to 1997. The median total Tinnitus Handicap Inventory score for those with tinnitus was 20 (interquartile range 52), and in 4 patients of the 14 with tinnitus (28.6%), the tinnitus handicap was moderate or severe. The onset of tinnitus was coincident with sudden sensorineural hearing loss in 8 patients (57% of the 14 with tinnitus) and occurred within 48 hours in the remaining 6 (43%). In 18 patients (86% of the 21 patients) a significant hearing handicap was demonstrated.

Thus it may be inferred that distressing tinnitus is not unusual following a sudden sensorineural hearing loss, and that therapy for both issues in hearing and tinnitus should be undertaken with such patients on a systematic basis in conjunction with medical treatment of the condition at the time of admission for a sudden hearing loss.
With the consensus that sudden sensorineural hearing loss needs urgent medical treatment, the majority of patients will be admitted to the otolaryngology ward. At this point, the patient may well be anxious and upset. Additionally, the patient may not yet be aware of the potential handicap associated with a unilateral sudden sensorineural hearing loss due to the structured and limited conversations that occur in a hospital ward. However, the admission represents an opportunity for early discussion and support that may prove beneficial on discharge.

As with the other otologic pathologies already described, clear and modern explanations of tinnitus mechanisms are beneficial. In the case of sudden sensorineural hearing loss, reference could be made to phantom limb analogies.

For many patients the tinnitus handicap following sudden sensorineural hearing loss is intimately bound up with hearing handicap. As such, instruction in hearing tactics, speech reading, and structured practice in auditory discrimination is of significant potential benefit in this patient group.

This chapter has discussed the specific strategies indicated in tinnitus therapy in three otologic pathologies. In all cases teamwork is key, and it is important to be aware that the treatment of the health condition may affect or even produce tinnitus. Counseling the patient about tinnitus and providing tinnitus treatment when necessary are vital to the overall success of the patient’s care.

Tinnitus research in the Cambridge Departments of Otology and Audiology have been supported by the British Tinnitus Association, the Meniere’s Society, and the de Turckheim Fund of Trinity College, Cambridge. We would like to express our thanks.
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Lifestyle Changes for Tinnitus Self-Management

ROBERT L. FOLMER, WILLIAM HAL MARTIN, YONGBING SHI, AND LINDA L. EDLEFSEN

We agree with Duckro et al (1984, p. 460), who wrote: “As with chronic pain, the treatment of chronic tinnitus is more accurately described in terms of management rather than cure.” The goal of tinnitus management is to reduce the severity of tinnitus until it is no longer a negative factor in the patient’s life. Appropriate lifestyle changes can facilitate this process.

To recommend specific lifestyle changes that will help tinnitus patients to improve their overall condition, an effective tinnitus management program should include the following:

- Clinicians who are willing to spend a substantial amount of time (up to several hours) with each patient
- Analysis of detailed health and psychosocial profiles of patients
- An interview/education session
- When possible, inclusion of spouses, significant others, relatives, or friends in the evaluation and treatment processes

Before recommendations for lifestyle changes can be formulated, factors contributing to tinnitus severity must be identified for each patient. We mail detailed questionnaires to patients prior to their initial tinnitus clinic appointment. Three of the questionnaires request information about patients’ health, hearing, and tinnitus histories (see Johnson, 1998, for questionnaire format and content). Twelve of the questions constitute a Tinnitus Severity Index (Meikle et al, 1995; see Fig. 5–1) that assesses the negative impacts of tinnitus on patients. Patients also fill out the State-Trait Anxiety Inventory (STAI; Spielberger, 1998) and an abbreviated version of the Beck Depression Inventory (Beck and Beck, 1972).
**Figure 5–1** Tinnitus Severity Index questions.

<table>
<thead>
<tr>
<th>Does your tinnitus</th>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Usually</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Make you feel irritable or nervous?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2. Make you feel tired or stressed?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3. Make it difficult for you to relax?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4. Make it uncomfortable to be in a quiet room?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5. Make it difficult to concentrate?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6. Make it harder to interact pleasantly with others?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>7. Interfere with your required activities (work or other responsibilities)?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>8. Interfere with your social activities or other things you do in your leisure time?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>9. Interfere with your overall enjoyment of life?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>10. Interfere with your ability to sleep?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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</tr>
<tr>
<td>11. How often do you have difficulty ignoring your tinnitus?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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</tr>
<tr>
<td>12. How often do you experience discomfort from tinnitus?</td>
<td>1</td>
<td>2</td>
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</tr>
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</table>
After reviewing the patient’s medical records and responses to questionnaires, we spend 1 to \(\frac{1}{2}\) hours interviewing each patient. This interview session serves several important purposes:

- It gives patients the opportunity to clarify and elaborate on their questionnaire responses.
- It gives clinicians the opportunity to ask additional questions.
- If patients are accompanied by spouses, friends, or relatives, these companions often provide important details about the patient’s physical and emotional state, social and work history, communication difficulties, and so on.
- During the interview, clinicians identify specific problem areas and discuss them with the patient.
- When possible, clinicians suggest strategies, protocols, or devices that are likely to reduce the severity of the patient’s tinnitus. Diagnostic testing is sometimes required before specific tinnitus management strategies are suggested.
- Part of the interview session is spent educating patients about possible causes of their tinnitus as well as reassuring and counseling them regarding factors that could exacerbate or improve their condition. If patients understand that their tinnitus is nothing more dangerous than a perception of sound, they will be able to pay less attention to it.

**Recommended Lifestyle Changes**

**Adjust Patient Expectations and Perspective**

Before patients arrive for their appointment in our clinic, we inform them in writing that we cannot “cure” their tinnitus. We also remind patients of this fact during their initial interview. Adjusting patient expectations into the reasonable range is an important step in the process of reducing tinnitus severity. However, as Tyler et al (2001) suggested, it is also important to provide patients with hope. Even though a cure for most cases of chronic tinnitus is not available now, there are many ways for patients to obtain relief from the symptoms.

The following observations have been made about patients who suffer from severe tinnitus: they tend to be very somatically aware and internally directed (i.e., they are high self-attenders; Newman et al, 1997); they often resent the persistence of the noises, wish to escape them, and worry excessively about their health and sanity (Hallam et al, 1988); and they have maladaptive coping strategies (this includes patients who attempt to avoid tinnitus, pray that their tinnitus will go away, and fantasize about not having tinnitus). Maladaptive coping strategies also include dwelling on tinnitus, talking to others about how unpleasant the noises are, and catastrophizing about the consequences of tinnitus (Budd & Pugh, 1996). Catastrophic thinking is reflected in statements by patients such as “My entire life has been disrupted and it is a daily struggle. . . . There is never any peace or escape” (Neher, 1991) A study by Budd and Pugh (1995) demonstrated that patients who believe tinnitus is beyond their control (“externals”) are more likely to experience severe tinnitus, anxiety, and depression than patients who believe they can exert some control over their symptoms and other life events (“internals”).
House (1981) made the following observations:

- Tinnitus as a symptom can become a scapegoat.
- Conflicts and needs are displaced on this symptom—it can be a chief concern and often an obsession.
- This obsession leads to other neurotic behavior, such as social withdrawal, isolation, and difficulty with reality contact.
- In some cases the tinnitus seems to take on the role of secondary gain—it can relieve the guilt associated with job failure or social conflicts.

It is important for patients to recognize that not all of their problems are necessarily attributable to tinnitus. Patients should be encouraged to identify problems that can be treated apart from their tinnitus. For example, some patients blame tinnitus for difficulties that are actually caused by hearing loss (e.g., difficulty understanding speech in noisy environments). Amplification will improve speech perception for many of these patients and can also reduce the loudness of their tinnitus.

Identification and treatment of problems mistakenly or disproportionately attributed to tinnitus can result in a reduction of importance patients assign to tinnitus. This will ultimately facilitate a reduction of tinnitus severity.

Rizzardo et al (1998, p. 24) stated that there appears to be a “link between psychological distress and tinnitus in a potential somatopsychological and psychosomatic vicious [cycle] (a psychological predisposition to react emotionally to events, tinnitus as a source of distress that reinforces the symptom, accentuating hypochondriac fears).”

Because patients with severe tinnitus sometimes develop cognitive distortions, including catastrophic thinking, cognitive-behavioral therapy can be useful (Andersson et al, 2001; Wayner, 1998). Some patients who exhibit maladaptive coping strategies improve when they are provided with cognitive coping strategies that are designed to help them interpret stressful situations and their disorder in more positive, adaptive ways (Holroyd et al, 1977; Kirsch et al, 1989).

Clinicians should strive to improve patients’ understanding of tinnitus and their perspective about the symptom, and provide strategies for coping with tinnitus during the education and counseling portions of appointments. However, a series of ongoing psychotherapy sessions is sometimes necessary for patients to make significant improvements in these areas. When appropriate, clinicians should encourage patients to pursue psychological counseling. Also, when possible, clinicians should provide referrals to mental health professionals who practice near the patient's home.

Improve Sleep Patterns

Patients who experience insomnia also tend to experience more severe tinnitus than patients who do not have trouble sleeping (Folmer and Griest, 2000). Improvements in sleep patterns are often associated with reductions in tinnitus severity (Folmer, 2002). If patients are not sleeping long enough or restfully enough, clinicians can recommend the following:

- Patients can bring pleasant sounds into the bedroom to reduce their perception of tinnitus. Of help are pillows embedded with flat speakers that can be
connected to any sound source. Tabletop sound generation machines also are useful. These machines play various soothing sounds, such as raindrops and ocean waves, and have an input jack for speaker pillows.

- If necessary, patients could use an over-the-counter sleep medication such as Alluna, Sominex, melatonin, Tylenol P.M., or Benadryl.

- If necessary, patients should talk to their physician about using prescription sleep medication such as Ambien or trazodone. Sleep medications should be used as needed, not necessarily every night. After sleep patterns stabilize, patients should try to reduce their usage of sleep medications.

- Patients should consult the list of recommendations provided by the National Sleep Foundation (http://www.sleepfoundation.org).

- Patients should pursue activities and develop strategies that promote stress reduction and relaxation. Relaxation/stress management therapy may be warranted.

- If insomnia persists, patients should go to a specialized sleep clinic for evaluation and treatment.

If patients report that they usually get enough restful sleep yet still feel tired while they are awake, clinicians should recommend that they have a complete physical examination, including blood tests of thyroid function (thyroxine or thyroid-stimulating hormone levels) and hemoglobin concentration. Successful treatment of hypothyroidism or anemia often relieves fatigue experienced by patients who have these disorders.

Reduce Anxiety

Tinnitus severity is positively correlated with patients’ level of anxiety (Folmer et al, 2001). Therefore, stress reduction is imperative for anxious patients. We use the State-Trait Anxiety Inventory (STAI) (Spielberger, 1998) to assess anxiety levels in our tinnitus patients. The average State Anxiety score (20 questions; minimum score 20, maximum score 80) for working adults is $35.5 \pm 10.5$ (Spielberger et al, 1983). If a patient scores 46 or higher on the questionnaire, anxiety management strategies should be recommended.

Like many psychological co-symptoms, anxiety is associated with other factors such as insomnia, depression, communication difficulties, and employment, financial, or social problems. For patients who exhibit anxiety disorders, we recommend evaluation by a psychiatrist, preferably one who specializes in stress management. Other patients may benefit from stress reduction or relaxation techniques taught by licensed therapists or counselors. The Anxiety Disorders Association of America (Silver Spring, MD; http://www.adaa.org) can help patients locate a qualified therapist.

Some patients benefit from hypnosis; some benefit from biofeedback; others benefit from an exercise program, yoga, meditation, or regular massage. Almost anything that reduces the patient’s level of stress or anxiety will decrease the severity of the tinnitus and will also help the person relax and sleep. Anxiolytic medication is necessary for some patients with severe anxiety.
Evaluation and Treatment of Depressed Patients

Depressed patients perceive their tinnitus to be more severe than do nondepressed patients (Folmer et al, 1999). In fact, the severity of tinnitus is positively correlated with the severity of patients’ depression (Folmer et al, 2001). Identification and treatment of depression are essential elements of an effective tinnitus management program. The U.S. Preventative Services Task Force (2002) recommended screening adult patients for depression. In its simplest form, this screening can be accomplished by asking patients two questions, such as, During the past 2 weeks, have you felt down, depressed, or hopeless? and During the past 2 weeks, have you felt little interest or pleasure in doing things? Affirmative responses to these questions should be followed by a more comprehensive analysis of depressive symptoms.

We use an abbreviated version of the Beck Depression Inventory (aBDI)—consisting of 13 multiple-choice questions—to assess depression in tinnitus patients (Beck and Beck, 1972). A score between 5 and 7 on the aBDI indicates mild depression. A score between 8 and 15 indicates moderate depression; a score of 16 or more indicates severe depression. The aBDI is a useful instrument because it is easy to administer and can identify depression in patients who do not recognize or admit the severity of their own depression. If a patient scores 8 or more on the aBDI, we recommend that he or she receives effective treatment for depression. If the patient has not yet received any treatment for depression, we first recommend evaluation by a psychiatrist. This should be followed by an ongoing series of psychotherapy sessions and possibly antidepressant medication.

Folmer (2002) analyzed the association between aBDI scores and Tinnitus Severity Index scores for 190 patients 6 to 36 months after their initial appointment in a tinnitus clinic. Patients whose Beck Depression score decreased 3 or more points at follow-up exhibited significant reductions in Tinnitus Severity Index scores. Patients whose follow-up Beck Depression score stayed within 0 to 2 points of their initial Beck score exhibited a smaller degree of improvement in tinnitus severity. However, patients whose initial Beck Depression score increased 3 or more points on the follow-up questionnaire did not exhibit significant changes in Tinnitus Severity Index scores. These results illustrate the importance of effective treatment for depression when it is present in tinnitus patients.

Break the Vicious Cycle

As illustrated in Fig. 5–2, the symptoms of tinnitus, fatigue, anxiety, and depression can form a vicious cycle and exacerbate each other (Folmer et al, 2001). Tinnitus is not always the starting point of this cycle. The cycle can begin at any point and progress in any direction. Some patients experienced depression, insomnia, or anxiety before their tinnitus began. A combination of medication and/or psychotherapy will typically reduce the severity of these symptoms and associated tinnitus. Patients should be encouraged to show Fig. 5–2 to psychiatrists or psychologists during their initial session with these clinicians. The diagram will help clinicians to understand the relationships among these symptoms associated with severe tinnitus. Specific tinnitus expertise is not required of mental health professionals in order for them to help patients. If clinicians...
can facilitate reductions in patients’ levels of insomnia, anxiety, and depression, the severity of tinnitus should also decrease (Folmer, 2002).

Address Communication Problems

Approximately 90% of all tinnitus patients have some degree of hearing loss (Meikle, 1997). Many of these patients report significant problems understanding conversations, television programs, movies, and so on. For patients who may benefit from amplification, we recommend a trial period with appropriate hearing aids. We also give information to patients regarding assistive listening devices and effective communication strategies.

Utilize Acoustic Therapy

Most patients report that tinnitus is more noticeable in quiet environments, such as their home at night. Clinicians should give this recommendation to every patient: add pleasant sounds to any environment that is too quiet. Regardless of which devices are used, the rationale for acoustic therapy remains the same: increase the level of external sounds in the patient’s environment to decrease the patient’s perception of tinnitus. Acoustic therapy devices include hearing aids, in-the-ear sound generators, in-the-ear combination instruments (hearing aid plus sound generator), tabletop sound machines, sound pillows, pillow speakers, audiotapes or compact discs, and fans.

Evaluate and Modify Medications

No medications are particularly effective for reducing the severity of tinnitus (Dobie, 1999). When appropriate, clinicians should recommend that patients consult with their physician about prescription medications to treat insomnia, anxiety, depression, phobias, obsessive-compulsive tendencies, or other psychological problems. For complex problems such as anxiety disorders or major depression, medication alone is seldom the answer. In fact, we place more importance on psychotherapy than medications in the treatment of these conditions. Patients may benefit from occasional, short-term use of anxiolytic or hypnotic medications. Some patients also benefit from using antidepressant medications. However, patients will not necessarily need to use any of these medications for
the rest of their lives. Clinicians should give all patients the goal of eventually improving to the point where they no longer need to take such medications. In some cases, effective psychotherapy can help patients progress so that prescription medications for sleep, anxiety, or depression are no longer required.

Anything that affects a patient’s metabolism can affect his or her hearing or tinnitus. For this reason, medical conditions such as hyper- or hypothyroidism, hyper- or hypoglycemia, hyperlipidemia, and hypertension must be identified and treated with appropriate medications as indicated.

Some patients take potentially ototoxic medications without knowing it. For example, patients take quinine-based medications for a variety of conditions, including leg cramps or restless legs. Patients with a history of epileptic activity sometimes take the antiseizure medication valproic acid. Some patients have taken furosemide (Lasix) for years as a diuretic to control hypertension. These medications may or may not exacerbate hearing loss or tinnitus for a particular patient. However, because the Physicians’ Desk Reference (2005) lists hearing loss and tinnitus as common side effects of quinine, valproic acid, and furosemide, we recommend that patients talk to their physician about the possibility of switching to an alternative medication that does not have the same ototoxic potential.

Conversely, it is important that clinicians do not discourage patients from trying a medication just because the Physicians’ Desk Reference (2005) lists tinnitus as one of its potential side effects. Almost every antidepressant, anxiolytic or hypnotic medication has the potential to trigger tinnitus for a small percentage of people who take it. In the vast majority of cases, tinnitus resolves after the patient stops taking the medication. For patients who already experience chronic tinnitus, this should not be a reason for them to avoid medications that could benefit them. For example, patients with a history of cardiovascular or cerebrovascular disease should not avoid taking 81 mg of aspirin daily if it is recommended by their physician. This small amount of aspirin is unlikely to increase the loudness of their tinnitus (see Fig. 5–3). However, the anticoagulant and anti-inflammatory properties of aspirin could save their lives. Even if a patient’s tinnitus increases after taking a particular medication, the tinnitus should return to its normal level after the person stops taking the medication.

Some tinnitus patients have a long list of medications they are currently taking. If the medications being taken by a patient seem excessive, redundant, or potentially hazardous, we recommend that each of the prescribing physicians reviews the entire regimen and decides if the present combination and dosage of medications are appropriate.

**Dietary Considerations**

Most patients report that low to moderate consumption of caffeine does not affect their tinnitus. We do not recommend a moratorium on caffeine for these patients. They may continue to enjoy coffee, tea, caffeinated soft drinks, or chocolate. As shown in Fig. 5–3, only ~9% of our patients report that caffeine increases the loudness of their tinnitus. In most of these cases, relatively high levels of caffeine consumption are responsible for increases in tinnitus. Instead, we recommend that patients reduce their intake of caffeine by switching to decaffeinated beverages as needed.
We make few other dietary recommendations for tinnitus patients. A small percentage of patients report that consumption of sugar, salt, dairy products, or other particular foods can increase the loudness of their tinnitus. As a result, patients voluntarily restrict their intake of these foods. Because such food sensitivity is relatively rare in the tinnitus patient population, clinicians should make dietary recommendations on an individual basis. Most patients are free to enjoy a varied, sensible diet.

ALCOHOL

Low to moderate consumption of alcohol is not a problem for most patients (see Fig. 5–3). In fact, many patients report that a drink or two helps them to relax and to be less bothered by tinnitus. Usually a greater volume of alcohol is required to increase tinnitus. A rule of thumb: when a person has consumed enough alcohol to initiate hangover symptoms (including headache), this seems to be the amount of alcohol that will also increase tinnitus. If a person consumes this much alcohol on a regular basis, it is probably excessive, and the patient should be evaluated for alcoholism. Using alcohol as a sleep aid is not recommended because metabolites of alcohol often interrupt sleep a few hours after drinking.

DIETARY SUPPLEMENTS

There are no dietary supplements or herbal or homeopathic preparations that are particularly effective at reducing the severity of tinnitus. In a double-blind placebo-controlled study of 1121 tinnitus patients, Drew and Davies (2001)
reported that *Ginkgo biloba* was not more effective than placebo at reducing the severity of tinnitus. Therefore, we do not recommend this supplement for tinnitus relief.

Most patients should take a multivitamin/mineral supplement daily after eating. These supplements alone will probably not reduce the loudness or severity of a patient’s tinnitus. However, they should help to maintain or improve the patient’s general health, including the integrity and functioning of the auditory system. Taking appropriate dietary supplements can also improve a patient’s sense of well-being. Patients who take an active role in their own health maintenance feel that they have greater control over their condition. This positive perspective can contribute to increased optimism and ultimately to reductions in tinnitus severity.

**Exercise**

Some patients reduce their level of physical activity because exercising increases the loudness of their tinnitus. This increase in tinnitus is almost always temporary and is related to increased blood pressure during exertion. Because the benefits of regular exercise (including stress reduction, improved cardiovascular health, muscle tone, mood, and sleep patterns) far outweigh a temporary increase in tinnitus, we recommend that patients engage in a variety of physical activities when possible.

**Reduce Unprotected Noise Exposure**

As shown in Fig. 5–3, more than 50% of our patients report that excessive noise exposure can increase the loudness of their tinnitus. We encourage patients to wear earplugs or earmuffs as protection against harmful sounds (gunfire, gas lawn mowers, leaf blowers, chain saws, circular saws, heavy machinery, loud music, etc.) because noise-induced hearing loss will compromise patients’ communication abilities and may also contribute to permanent increases in their tinnitus. Clinicians can educate patients about the mechanisms and permanent nature of noise-induced hearing loss by using large ear models and photomicrographs of hair cells damaged by excessive noise exposure (see e.g., Slepecky, 1986). Patients should be shown evidence of their own noise-induced hearing loss during discussions of the results of audiometric tests.

**Desensitize the Patient’s Auditory System**

Hypersensitivity to sound causes some patients to develop aversions to restaurants, movies, sporting events, concerts, parties, or church services and to abhor the sounds of a vacuum cleaner, sirens, bus brakes, or silverware striking plates or drinking glasses. Clinicians should explain to patients that their increased sensitivity to sounds is a reflection of damage to outer hair cells that results in a form of recruitment. There is a real physiological reason—damage to the auditory system—that some sounds bother patients more than they used to. However, some patients develop extreme phonophobia, and wear earplugs most of the time. These patients often withdraw from the workplace and all forms of
socialization. Fear of sound exposure can cause them to become reclusive. This exaggerated response is a reflection of the patient’s mental state and coping skills. In these cases, we make the following recommendations:

- Patients should stop wearing hearing protection unless they are exposed to hazardous levels of sound. Overuse of earplugs or earmuffs can contribute to hypersensitization of the auditory system.
- To desensitize their auditory system, we encourage patients to listen to pleasant sounds (e.g., music or water/masking sounds) at comfortable levels. Patients can listen to these sounds through headphones, speakers, or in-the-ear sound generators. In addition to desensitizing patients’ auditory system, this may help to reduce patients’ fear of sounds.
- Patients should be encouraged to increase socialization, resume employment if they are able, and rejoin society as soon as possible. It is true that the urban environment is often noisy, but becoming a recluse because of phonophobia is not a healthy lifestyle.
- When appropriate, we recommend mental health evaluations and psychotherapy to help patients break their cycle of fearful thoughts and behaviors.

Modify Employment Status or Responsibilities

Most patients say their tinnitus is less bothersome when they are busy. Even if patients are retired or physically or mentally disabled, it is important for them to occupy their time with enjoyable and rewarding activities such as hobbies or volunteer work. They will then have less time to dwell or focus on their tinnitus. Patients should be encouraged to seek employment or to continue working if they are able to do so. Employment can provide patients with a sense of purpose, increased self-esteem, optimism, and financial stability. In addition to experiencing depression and having low self-esteem and few financial resources, unemployed patients often exaggerate the magnitude of their auditory symptoms. Patients who are too young to retire and are physically and mentally able to work should be encouraged to do so. Even a relatively simple part-time job is preferable to staying home every day and receiving a stipend from a governmental agency.

We give a copy of the Newsweek article “Healing Myself with the Power of Work” (Norlen, 1999) to patients who need encouragement to seek employment. The author of the article was an attorney who stopped practicing law after 6 years because of severe depression. A job he took delivering morning newspapers helped him to regain his self-esteem and perspective. He concluded, “One day soon I’ll be ready to leave this job behind, but I’ll never again view work as just a paycheck or a daily obligation. It will always be a part of my therapy, my healing. I don’t know where my next job will be, in the courtroom, the classroom or the office. But wherever it is, my work will be a weapon in my arsenal against the attacks I know will come again and again.”

Many of the observations in the article apply to tinnitus patients who have stopped working and socializing because of depression and despair. As it did for the article’s author, gainful employment can help tinnitus patients to feel more productive and hopeful. The article brings up another common
theme: some people dislike their present job and feel stressed about going to it every day. Remember that House (1981, p. 198) observed that “tinnitus as a symptom can become a scapegoat . . . it can relieve the guilt associated with job failure or social conflicts.” Some patients use tinnitus as an excuse for quitting a job they don’t like because their work or workplace elicits unacceptable levels of stress for them. It is beneficial for such patients to realize that tinnitus is not the main problem at their workplace. Clinicians should help patients to make this distinction whenever possible. We do not usually encourage patients to quit their current job because such an action has financial and personal consequences that go beyond our clinical responsibilities. However, if it is clear that a patient does not want to continue in his or her current position, we help the patient to explore other possibilities. State vocational rehabilitation agencies can assist patients in this process.

Tinnitus and hearing loss can interfere with patients’ abilities to perform some jobs. Information about different types of hearing aids, effective communication strategies, and assistive listening devices such as telephone amplifiers or FM systems should be given to patients who complain about communication problems at work.

Patients in noisy professions must take precautions to protect their hearing. In some cases, tinnitus patients need to modify their work environment or duties to minimize occupational noise exposure. When necessary, patients should seek employment in a quieter environment within their current company or with a new employer.

Cultivate Personal Relationships/Increase Socialization

Personal relationships can suffer because of tinnitus or sound sensitivity. Some patients reduce socialization because of discomfort in noisy environments or because they are not sure how they may feel on a given occasion. Clinicians should encourage patients to continue employment and participation in social activities as much as possible for the following reasons:

• When patients are busy, their tinnitus is less noticeable and less bothersome.
• Social contact can help patients to achieve or maintain a healthy perspective about their auditory symptoms.
• If patients stop working and socializing, they often give in to counterproductive feelings of hopelessness and despair. They then attribute a disproportionate amount of importance to their auditory symptoms.
• Friends, family members, and coworkers are more likely to be sympathetic and lend support to the patient if the person gives realistic descriptions of the symptoms and makes efforts to persevere in spite of them.
• Patients feel better about themselves and more optimistic about the future if they remain active members of society.

Patients with supportive social and family relationships usually have more success coping with chronic medical conditions. Sullivan et al (1994) reported that patients who sought social support and those who had positive interactions with their spouse exhibited less tinnitus-related dysfunction than patients who did not experience supportive personal relationships.
Referrals to Other Health Care Professionals

If we detect any additional medical conditions that should receive evaluation or treatment, we refer patients to their primary care physician or to clinical specialists.

Conclusion

If patients can be motivated to implement positive lifestyle changes such as those described in this chapter, their overall condition will improve and the severity of their tinnitus will decrease. The key word in this process is *implementation*: patients need to make concrete efforts to follow specific recommendations formulated by health care professionals. Patients should be encouraged to take responsibility for their own improvement. Ultimately, the motivation to initiate and maintain positive lifestyle changes must come from within each patient.

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Tinnitus Habituation Therapy

RICHARD S. HALLAM AND LAURENCE MCKENNA

The habituation model of tinnitus has been around for over 20 years (Hallam et al, 1984), and although direct proof of its validity is hard to find, it has provided a useful framework for conceptualizing responses to tinnitus treatment. In essence, it suggests that tinnitus can be compared in its effects to an unwanted external sound and that complaints about tinnitus are as much related to psychological and environmental factors as to any underlying dysfunction of the auditory system. For example, tinnitus may not be bothersome when it is masked or partially masked by ambient sounds or when attention is captured by other absorbing activities.

In broad outline, it was proposed that complaints about tinnitus are a consequence of a failure to cease attending to this essentially irrelevant signal. This failure may derive from internal factors that determine readiness to attend (e.g., tonic arousal), from increased salience of the signal (e.g., resulting from learned affective significance), or from the intrinsic novelty of a signal that may be intermittent or may change in quality or intensity. It was suggested that these factors can interact to increase complaints. For example, attending to tinnitus may interrupt the execution of automatic response sequences leading to a change in state or affect. Moreover, the active processing of the negative meaning of the tinnitus following a switch of attention may have similar consequences by eliciting negative emotions or by changing central nervous system arousal. We believe that the interaction of these factors is best conceptualized in terms of feedback loops that lead to “roadblocks” that get in the way of the spontaneous process of habituation of attention. In other words, learning to ignore tinnitus is both a natural and an inevitable process as long as patients (1) are able to learn to view it as a meaningless sound and (2) do not engage in methods of coping that, in opposition to their intention, have maladaptive consequences and serve to maintain attention to it. There are thus several psychological pathways to tinnitus complaint, and in this chapter we identify what they are and suggest some remedies.

The habituation model was based on clinical experience of treating tinnitus patients, factor analytic studies of tinnitus complaint, and empirical outcome
studies. Complaints have been grouped into emotional distress, reflecting the affective significance of tinnitus; intrusiveness, reflecting the effects on attentional processes; auditory perceptual difficulties, reflecting associated interference with hearing; and insomnia, which is a common problem for these patients (Hallam, 1996).

It is natural for patients to maintain that tinnitus is a problem because it is loud or has recently become louder. Tinnitus may have a gradual onset, so that it may be several years before an intermittent, low-intensity tinnitus becomes bothersome (Erlandsson et al., 1992). Tinnitus intensity must of course be a factor in complaint, just as it is with external noises that may become difficult to ignore if they get louder. In fact, we have found small but significant correlations between psychoacoustic measures of tinnitus intensity and tinnitus distress (Hallam and Jakes, 1985). However, tinnitus being loud, or louder than it was, does not preclude habituation but only means that the patient may require a longer period of adaptation. It has also been found that tinnitus is rated as more severe when it consists of a complex of different and changing sounds (Dineen et al., 1997; Hallberg and Erlandsson, 1993). It is therefore important that patients are helped to understand the phenomenon of attention and the role that loudness and other psychological factors may play in drawing attention to tinnitus. We deal with this subject in this chapter; see also Hallam (1989a).

**Habituation Therapy**

Although tinnitus affects a large minority of the population, a much smaller number of people (0.5–1% of the population) are severely affected by it. This chapter mainly concerns those who attend clinics with tinnitus complaints that have persisted for a year or more. It does not consider hearing impairment and its remediation, masking or partial masking devices, or insomnia, which are all dealt with in other chapters. It outlines the chief psychological considerations in assessment and makes recommendations as to the kind of approach to take with different "roadblocks" to habituation. With psychological techniques, there is no expectation that the tinnitus will disappear, but we can claim a "cure" when the patient no longer pays attention to the tinnitus (except perhaps when temporarily stressed or when unoccupied in a very quiet environment). Although research treatment trials often adopt a cookbook approach to tinnitus management, it is important to conduct a careful psychological assessment to identify the factors most likely to be maintaining attention to the problem in each individual case and to tailor therapy accordingly.

This chapter first describes the rationales of attention and relaxation therapies but does not provide details of treatment techniques because these have been discussed in other chapters. Cognitive-behavioral therapy (CBT) may be less familiar to readers and will be discussed more extensively. CBT is based on the flexible use of principles rather than fixed protocols, and we advocate a tailored approach based on a formulation of each patient's particular needs.

Many recently affected patients who attend a clinic require only reassurance about their health status and good information. Others with a recent onset may in fact be reporting dishabituation brought on by a change in emotional state or a change in ambient sound levels in the home environment or workplace.
All patients should be screened at least briefly, so that those who appear to be complaining of tinnitus as a sign of other psychological difficulties can be referred to a more appropriate service. This group will include clinically anxious and depressed patients whose emotional state is primary rather than secondary to tinnitus onset. Treatment of a primary condition may be the most helpful approach, as in the case of the phobic patient treated by Hallam and Jakes (1985).

**Roadblocks to Habituation Therapy**

Apart from the cases in which tinnitus complaint is secondary to other problems, the following kinds of roadblocks to naturally occurring habituation can be identified:

1. **Elevated arousal states in which habituation is slow or nonexistent.** It is known that attention narrows to the most salient stimuli as arousal increases (e.g., as in states of fear or anxiety). An alteration in emotional state or the presence of stressors could therefore precipitate complaint about a preexisting and previously habituated tinnitus. Alternatively, a change of arousal may be associated with the emotional consequence of negative beliefs about the significance of tinnitus or result from the way attention to tinnitus interrupts habitual activities, such as conversing or reading, leading to frustration or increased effort.

2. **Avoidance of exposure to external noise and/or tinnitus.** Paradoxically, habituation requires that a person attend to tinnitus to learn to ignore it. The coping strategy of carrying out attention-absorbing activities (to “avoid” listening to the noise and the tinnitus) may be functional at moderate levels but become maladaptive when the effort required leads to excessive stress or even exhaustion. In the case where external sounds lead to an increase in tinnitus intensity, the person may adopt the reasonable strategy of avoiding them. However, avoiding may become maladaptive if it leads to the restriction of social activities to such an extent that opportunities for enjoyment are excluded.

3. **Negative beliefs about tinnitus.** Attention to tinnitus is maintained when it becomes meaningful in the negative sense that it represents an irresolvable threat. There are two major types of belief:
   - A belief that the tinnitus represents a serious threat to physical or mental welfare and therefore that it would be unsafe to ignore it
   - A belief that it is unfair to be afflicted by tinnitus, implying that others are to blame or that there must be a cure for the problem that others are denying them

The following sections address these roadblocks. A very important component of tinnitus counseling is the initial stage of educating the patient about the nature of tinnitus intolerance and explaining how cognitive-behavioral techniques can be of benefit.

**Effects of Arousal, Mood, and Attentional Strategies on Tinnitus Habituation**

It is convenient to begin by defining a state of habituated tinnitus, which can be likened to the relationship individuals have with the sound of their own
breathing. This is clearly audible but, in general, not processed in conscious awareness. We assume that where there is consistent stimulus–response mapping, the sound of breathing is monitored at an unconscious level, and, other things being equal, this automatic monitoring does not affect other psychological processes. The sound of breathing is mapped onto a response signaling that everything is proceeding normally. However, if the auditory stimulus changes, such as when one has a nasal blockage producing a strange sound, the signal is likely to be processed consciously. There may be a momentary switch of attention from another activity to the nasal sound, at which point a ready-made interpretation can be assigned and the person may react by, say, blowing the nose. It is generally accepted that the system for attending with awareness has capacity limits. Moreover, the act of switching attention may interrupt other ongoing activities that are fully occupying attentional resources (e.g., a nasal blockage while giving a public lecture). For this reason, the consequences of attending to tinnitus will be context-related. It will be more annoying in some situations than others depending on the nature of competing activities. (The detectability of tinnitus will also depend on the magnitude of the tinnitus signal relative to the ambient noise level.)

We assume that, because tinnitus is an auditory signal, switching attention to it will be more disruptive when the ongoing activity uses auditory channels or sub-vocal auditory imagery. This assumption is consistent with the kinds of activities that people choose to compete with attention to their tinnitus (i.e., predominantly visuomotor tasks, e.g., car repairs, walking, and painting.) It is also feasible to speculate that the automatic monitoring of the tinnitus signal out of awareness will interfere more with the conscious (controlled) processing of auditory stimuli than of stimuli in other channels (e.g., the task of piano tuning or composing music), especially when the sounds are similar (Hallam, 1989b).

The ability of tinnitus to demand attention accounts for its intrusiveness (i.e., its being loud, persistent, or impossible to ignore). The development of habituation of attention to tinnitus will depend on a further set of psychological factors, as follows:

1. **The degree of stimulus–response mapping.** The automatization of tinnitus monitoring will be aided by a consistent meaning analysis of its presence. This may amount to accepting tinnitus in the sense that there are in fact few effective coping responses apart from just acknowledging its presence. Habituation will be delayed by responses such as, What is this? Why have I got this? and What can I do about this? These questions imply no consistent relationship between a stimulus and response.

2. **Threat/anger interpretations.** If a consistent threatening meaning is assigned to tinnitus, habituation will be delayed because the signal will be processed as too important to ignore. Tinnitus may serve as a reminder of unfinished business (e.g., seeking attention for health care or becoming involved in litigation), which, if not attended to, will intensify its affective significance. Processing this affective information will further deplete attentional resources so that maintenance of attention on primary tasks will be impaired.

3. **Self-focused attention.** Unlike an external sound, tinnitus is located internally and so is likely to lead to an internal focus of attention on other internal sources of distress that have no intrinsic relationship to it.
(e.g., self-deprecating thoughts and worries about job or finances; Matthews and Wells, 1996; Newman et al, 1997). These in turn may perpetuate high levels of affective arousal and a negative outlook on life in general.

4. **Level of cortical or sympathetic nervous system arousal.** We assume that the tendency to become distracted from a primary task and pay attention to tinnitus is related to higher levels of bodily arousal. It follows that habituation will be delayed by any intrinsic or extrinsic source of arousal, such as a mood disorder or environmental stress. Elevation in arousal may also be one of the consequences of paying attention to tinnitus. Temporary changes can be expected to result from the interruption of a primary activity or the processing of threatening information following a shift of attention to the tinnitus noise. Longer-term changes in arousal would be predicted if insomnia is present and leads to persistent sleeplessness.

5. **Personality factors.** We assume that personality factors play a significant role in tinnitus distress. Ability to hold attention on the primary task and avoid shifting attention to irrelevant channels (attentional focusing; Pines et al, 1989) may predict reduced likelihood of tinnitus distress. Obsessional personality characteristics are correlated with tinnitus complaint (Eriksson-Mangold and Carlsson, 1991). The personality factor of rigidity has been shown to be related to annoyance from external noise (Brand et al, 1995).

**Techniques for Modifying Arousal or the Process of Attending in Tinnitus Habituation**

The present status of these techniques is one in which a healthy eclecticism holds sway. A variety of strategies for modifying arousal have been tried and found beneficial for some patients at least. Overall, gains have been modest and not always long-lasting. In most cases patients benefit from a combination of techniques, and effectiveness depends on personal preference and the individual characteristics of the patient’s tinnitus. The habituation of attention model is consistent with the findings of empirical research, but given the range of factors it includes, there is no simple way of testing the model’s validity.

A study of coping in tinnitus subjects has found two main types of strategy (Budd and Pugh, 1996). Maladaptive patterns included wishing the tinnitus away and various forms of avoidance and escape. These patterns are likely to lead to roadblocks because, according to our model, it is necessary to acknowledge the presence of tinnitus as a reality and confront it as an object of attention in order for habituation to take place. A second cluster of more effective coping techniques was identified. These included giving full attention to primary tasks in which an external focus of attention is required, the use of distraction, and regarding tinnitus as one of the normal challenges of life. The study underlines the value of a redirection of attention where distraction is used as an aid rather than as a means of escape. For example, listening to background music may help.

**Relaxation Training**

This approach can be regarded as a solid standby that has most consistently shown benefits in clinical trials. Instructions for training will not be repeated
here (see Hallam, 1989a, and Chapter 3), but the following elements are considered to be important.

1. **Initial training should be performed with a skilled therapist so that patients learn what relaxation feels like.** This may take between one and five sessions, depending on a person’s initial degree of tension and willingness to let go. For a minority of people, the act of letting go is anxiety-provoking in itself and may require separate treatment.

2. **Success can only be achieved with adequate practice.** For example, it is usual to suggest two 20- to 30-minute daily exercises involving listening to taped instructions (either the therapist’s voice or a suitable commercial tape). Many people find it difficult to arrange the time and comfortable surroundings to practice. It may take 2 to 3 months to learn deep relaxation.

3. **In our clinical experience, it is neither advisable nor necessary to use the method of alternate muscle tensing and relaxing.** This is especially relevant to elderly patients with joint or muscle problems. The use of suggestion and/or calming imagery should be adequate to induce relaxation.

There are several optional refinements. In applied relaxation, the patient learns a quick relaxation response on cue and applies it when experiencing tense situations. Relaxation exercises may include attentional training or modification of tinnitus imagery (see next section).

According to the habituation of attention model, relaxation should assist people who habitually try to avoid or escape their tinnitus. Instructions can include listening to the tinnitus while relaxed. The patient learns that it is possible to listen with equanimity, and an alternative stimulus–response mapping can be acquired. Relaxation should also lead to lower levels of bodily arousal in which the tendency to switch attention to novel or potentially threatening signals is reduced.

**Training in Attentional Control**

Adopting the concept of a cognitive skill, Hallam and Jakes (1985) attempted to train tinnitus sufferers, while in a relaxed state, to alternate their attention (every 20–30 seconds) between tinnitus and external background sounds or pleasant mental images. Few participants reported this training to be particularly helpful, and a group that received relaxation alone fared equally well. However, the training was brief, and the sample size was small. Scott and colleagues (1985) provided training in self-control through distraction (in addition to relaxation), and many subsequent studies have incorporated attentional control. Rather than switch to other bodily sensations or external sounds, patients can switch to vivid mental images that incorporate several sensory modalities. Studies by Henry and Wilson (1998) and Eysel-Gosepath et al (2004) provide support for the view that training in switching attention has some promise. Details of techniques can be found in Henry and Wilson (2001), who recommend 10 to 20 minutes of daily practice of the technique.

Attentional training has been advocated in the much broader arena of worry and mental intrusions (see Wells, 2000, pp. 145, 146, for instructions) to refocus attention away from negative self-appraisals onto external stimuli (sounds are
used in the training). Wells’s conceptual model provides a framework in which tinnitus treatments could be undertaken on an experimental basis.

**Distraction**

The aim of distraction is to become involved deliberately in activities that fully occupy attentional resources and thereby minimize the focus on tinnitus. Most tinnitus sufferers spontaneously turn to this technique. As already noted, the distracting activity should be absorbing and preferably use other sensory channels, such as the visual. The technique is not necessarily helpful if it is a form of fearful avoidance of tinnitus. We have encountered patients who exhaust themselves in distracting activities. Nevertheless, it can be a valuable form of relief.

**Modification of Tinnitus Imagery**

The quality of tinnitus varies enormously, from clicks and buzzes, to hisses and roaring. The associations these sounds conjure up may be highly unpleasant (e.g., a jet plane overhead). The aim of this technique is to develop a pleasant image into which the tinnitus can be incorporated because it can be reinterpreted as similar to a pleasant sound (e.g., a boiling kettle, ocean waves, or wind in the trees). We are not aware of systematic evaluations of this technique, although it is easy to see how it could be included in an overall package of therapy, especially if the patient has good imagery ability. It would presumably facilitate habituation of attention by reducing the threat value of the tinnitus and by setting up a consistent stimulus–response mapping.

**Changing Beliefs about Tinnitus: Using Cognitive-Behavioral Principles to Affect Tinnitus Habituation**

This section is based on over 20 years’ experience of applying the cognitive-behavioral approach to tinnitus. The basic assumption in the cognitive theory of emotion is that an emotional response to any triggering situation is mediated by a conscious (or potentially conscious) appraisal of that situation. In other words, there is a conscious thought between some event and a subsequent emotional response (Beck, 1976). Emotional responses to tinnitus can also be understood in these terms; that is, there is a conscious thought between the perception of the tinnitus and the subsequent emotional reaction. This formulation may help to make sense of the strength of the reaction that some people have to tinnitus. Given that tinnitus is often matched to relatively quiet external sounds, the level of emotional distress associated with it may seem incongruent unless we understand the individual’s appraisal of the tinnitus and his or her ability to cope with it. The cognitive-behavioral model describes a circular relationship between a person’s thoughts and emotional state such that thoughts become more skewed, or negatively biased, as the emotional state deteriorates, leading to more negative or unhelpful thoughts. In this way, distressing emotions and unhelpful thoughts maintain one another. The cognitive model of emotion suggests that once an event, in this case tinnitus, is perceived as threatening, attention will become fixed on it to the detriment of the sufferer’s ability to process
other information. This binding of attention will lead in turn to an increased focus on tinnitus and an increase in distress.

**Educating the Patient**

To maximize the possible benefits of a psychological approach, it is important to educate patients about the processes involved in their problem as well as about the therapeutic process. Early on in our therapy we educate our patients about tinnitus. This involves telling patients about the epidemiology of tinnitus and in particular that much larger numbers of people have tinnitus than suffer from it. The idea that people usually habituate to tinnitus naturally is stressed, and the process of habituation is described, making clear that habituation will mean that the person will no longer react to tinnitus. Patients sometimes ask if this means that tinnitus will no longer be heard. We answer this by saying that patients who do not react to tinnitus are no longer attending to it, indicating that they are unlikely to be aware of it for much of the time. It is emphasized that the psychophysical parameters of tinnitus are not good predictors of whether or not a person will be distressed by it and do not represent the main roadblocks to habituation. The patient is told instead that the level of stress (or autonomic nervous system) arousal and the negative interpretation that people place on tinnitus represent the main roadblocks. It is made clear to the patient that these factors can be changed. The point is to stress that having tinnitus, even loud tinnitus or tinnitus of a particular quality, does not lead inevitably to suffering. Emphasizing the importance of arousal and interpretation paves the way for the introduction of the therapeutic approaches outlined in this chapter.

Care is needed when educating patients about tinnitus. Instead of being reassured by the information given, some patients become anxious about their ability, or lack of it, to cope with tinnitus. Rather than interpreting the information in terms of the possibility of improvement, they may have thoughts about their own lack of progress (e.g., “If everyone else can come to terms with tinnitus, why can’t I? I must be too weak”). It is therefore important that the therapist seeks feedback from the patient about the information given, is sensitive to the patient’s concerns, and is able to address these therapeutically if necessary.

When done skillfully, assessment and therapy are seamless within cognitive-behavioral therapy. However, it is important, early on in the process, to “socialize” or educate the patient about the cognitive-behavioral model. In essence, this involves helping the patient to see the link between thinking and affect, behavior, or bodily state. This helps the patient and the therapist make sense of the problem, gives coherence to the treatment, and sets the scene for interventions. It is also important to decide whether the therapy will focus primarily on tinnitus in a relatively brief format (5–15 sessions) or deal with broader core beliefs (see later discussion), which may take longer.

There are several suggestions in the literature about how to educate people about the cognitive model of emotion (e.g., Beck, 1995; Padesky and Mooney, 1990). In some cases, additional care and sensitivity may be needed when educating tinnitus patients about this approach, particularly if they do not readily see
their problems in psychological terms and are instead seeking a physical cure. Nonetheless, the fundamental principles of CBT remain the same. Metaphors may be used to inform the patient about the CBT model. Illustrations that are based on issues other than tinnitus can be particularly helpful at this stage. One such illustration involves asking the patient to imagine being on a crowded train and being poked in the back by someone’s umbrella. The therapist inquires about the patient’s emotional reaction to this and then about what went through his or her mind about the person with the umbrella. Commonly, people state that they would feel annoyed if they were in that situation and would think of the person with the umbrella as careless or aggressive. Patients are then asked to imagine their likely reaction on discovering that the person with the umbrella is blind and again to say what went through their mind on discovering this. Usually, people report feeling more sympathetic or tolerant toward the blind person and having benign thoughts, such as “The poke in the back was an accident.” Patients are then helped to see the link between the specific thoughts and the emotional states that they described. Alternatively, we may ask patients to reflect on their emotional state and the thoughts they were having while waiting to see the therapist. Whether or not metaphor, or some other illustrative process, is used, it is necessary to help patients make connections between their own thoughts and emotions. To this end care is given to highlighting links between thinking, mood, behavior, and bodily state (including tinnitus) in patients’ account of their own difficulties. It is our practice to provide patients with written material explaining anxiety, depression, and so on, and the assessment and treatment of these problems in terms of the cognitive-behavioral model. Patients and therapists should form an agreed agenda for each session. It is useful to think of the patient–therapist relationship as a joint effort. It is not the therapist’s role to “reform” the patient but rather to work with the patient against “it.”

A typical therapeutic approach that seeks to break the cycle of tinnitus distress will be used to illustrate the various stages of treatment. Albert, a 32-year-old financier, developed tinnitus 6 months prior to seeing the psychologist. A year before his first appointment with the psychologist he had developed a skin disorder and was initially given an alarming diagnosis and pessimistic prognosis. Although the diagnosis proved incorrect and the initial skin problem resolved, Albert became very anxious and experienced prominent physical symptoms of anxiety, including further skin rashes, changes in heart rate, and tightness in his throat. Over the following months he underwent numerous medical investigations, all of which proved to be negative. One of these investigations, a computed tomographic scan, was followed by what he later understood to be a panic attack but which at the time he thought was a physical collapse. His tinnitus emerged shortly after the panic attack. Audiological investigations revealed no other abnormality. His emotional state, as measured by the Beck Anxiety Inventory (Beck and Steer, 1990) and the Beck Depression Inventory (Beck et al, 1996), suggested that he was suffering from a severe degree of anxiety and a mild degree of depression. His responses to a measure of tinnitus complaint (the Tinnitus Questionnaire; Hallam, 1996) indicated that his reaction to tinnitus was severe. When first seen he was on sick leave from work.
Identifying Unhelpful Thoughts

A key element in the cognitive-behavioral management of tinnitus is the identification of unhelpful thoughts. Thoughts about tinnitus, or any other event, are often not well articulated, but occur in a shorthand or telegraphic form. They are not thought to arise in a reasoned way as a result of deliberation or a logical consideration of tinnitus. Rather, it is assumed that the thoughts just happen automatically, without an attempt to initiate them. They are therefore referred to as automatic thoughts. These thoughts are regarded by the patient as plausible even though others may regard them as farfetched and even though they may be contrary to objective evidence. Because they are “automatic,” a person may not be fully aware of his or her thoughts about tinnitus, or any other given situation, unless primed to focus on them. Guidance on how to identify automatic thoughts can be found in the literature (e.g., Beck, 1995; Wells, 1997). A common mistake is to ask people, What do you think about your tinnitus? We try to avoid this because it can lead patients to suppose that they should produce a reasonable, coherent verbal train of thought. What is needed instead is to access the stream of consciousness. It is often useful to re-create a specific, typical incident in which the patient was distressed about tinnitus. An attempt should be made to recall the event in considerable detail and in so doing to re-create a clear memory of the emotion associated with it. When this has been achieved, the patient can be asked to recall what went through his or her mind at the time.

For example, Albert complained of frequently finding his tinnitus highly intrusive. He was asked to describe specific situations in which this happened. Albert began by saying that he experienced more intrusive tinnitus in situations in which there were high levels of everyday noise. When asked to say more about this, he described playing with his children and noticing how loud their laughter and joyful screams were. He also described a time when he used a vacuum cleaner and his tinnitus became louder. When asked to remember each of these situations in detail, he was able to say that the idea went through his mind that the noises would lead to a permanent worsening of his tinnitus and that he would not be able to cope with this; he had an image of himself in the future as a bed-bound invalid. He noted that this image of himself in the future and his strategy of going to bed to avoid noise made his tinnitus worse. He generalized his ideas about noise and tinnitus to almost all loud sounds and as a result adopted an avoidant lifestyle. Albert also described being in a park, watching some older adults playing with their grandchildren, and at the same time becoming anxious and experiencing his tinnitus as more intrusive. After being asked to describe the scene in detail (e.g., the sounds and smells associated with the scene, as well as the visual images), he was able to say that at the time he experienced an image of himself as an old man still plagued by tinnitus and being unable to play with his grandchildren. Such thoughts and avoidance strategies represent roadblocks to habituation.

A patient’s thoughts about tinnitus can also be discovered by asking the person what is going through his or her mind during a change in the patient’s affect, such as when the patient cries; thoughts can be particularly accessible at such times. An alternative to eliciting thoughts in the therapy session is to ask patients to keep a diary of thoughts and emotions. They record situations in which they notice that
tinnitus is more intrusive; they note how they felt at the time and also what they
were thinking about what was going on. If patients report having no periods of
distress or intrusive tinnitus, then they can be asked to enter situations deliber-
ately that they believe may provoke distress. Patients are encouraged to record
their thoughts in a verbatim manner rather than to compose perfect prose; this
allows useful access to the person’s stream of thought. It is important to note
that a patient may have many thoughts about tinnitus and that not all of these
will be inaccurate. For example, the thought “My tinnitus will never go away”
may not be considered inaccurate. It is therefore important that the therapist
does not stop seeking the distressing thoughts at this point but rather seeks the
implication of such thoughts (e.g., “Because my tinnitus will never go away, I
will never be happy again”). An attempt to address thoughts such as “I have
tinnitus; it will never go away” is likely to lead to the therapist and patient
being confronted by a therapeutic roadblock. Addressing the implications of
such thoughts (e.g., “I will never be happy again”) is likely to offer therapeutic
opportunities. For further discussion of this distinction, see Wells (1997) and
Moorey and Greer (2002).

Despite considerable emphasis on current events and the way a person thinks
about them, the cognitive model of emotion also takes account of “deeper” cogni-
tive processes. These include core beliefs, or assumptions of an absolute nature
about the self, others, and the world. These usually derive from early experiences
rather than the result of careful reasoning, but are accepted as “just the way things
are.” Core beliefs can be positive or negative, but it is the negative aspect that is
usually more salient when people are in a state of emotional distress.

Albert had a difficult relationship with his father that dated back to his early
childhood. His father wanted Albert to do very well in life and, in an attempt
to motivate him, frequently compared Albert unfavorably with other children
in the extended family and often rebuked him sternly in public for minor misde-
meanors. Albert believed that he could never please his father and developed a
core belief that he was “not good enough,” in the sense that he was neither com-
petent nor lovable.

Between core beliefs and thoughts about the current situation are intermediary
beliefs, or assumptions. The themes present in automatic thoughts often give a
cue to the underlying rules, assumptions, and beliefs. The content of these
deeper assumptions and beliefs can be discovered by asking patients about the
implications of their automatic thoughts and continuing to ask this question
about each belief that is revealed in this way until a “bottom line” is reached.
This is known as the vertical arrow technique.

For example, Albert felt particularly distressed following a temporary increase
in the intrusiveness of his tinnitus. When asked what was going through his mind,
he said that he would be unable to fulfill his usual responsibilities and that he
would have to go to bed. When asked “If it is true that you will have to go to
bed, what would this mean to you?” he said that he would feel even worse
because it would mean that he would be letting people down. When asked
again “If it is true that you will be letting people down, what would this mean
to you?” he said that he would be out of control of his emotions. When asked
again “If this is true, what does it mean to you?” he said: “That’s it, I would be
out of control.” This “bottom line” suggested that he held the assumption that
if he felt anxious, he would be out of control. Having discovered this, he was asked what his rules for living were, and this question revealed his belief that he should always be competent and in control of his emotions. Further guidance on eliciting rules, assumptions, and deeper beliefs can be found in Beck (1995) and Wells (1997). A person’s assumptions and core beliefs may lead the person to react in a consistent way to situations that outwardly seem different. It may also be the case that a person is particularly distressed by tinnitus because it provokes a reawakening of a negative core belief or assumption or threatens a method of coping linked to an assumption. If core beliefs are thought to play a significant role in tinnitus distress, a brief CBT protocol is unlikely to be effective. The patient may have to be referred for longer therapy unless the therapist has the flexibility and resources to pursue it.

Changing Thoughts

In essence, treatment consists of changing an incorrect belief for a correct one—and the reversal of the exacerbation cycle. Beck (1976) stated the matter succinctly: “By correcting erroneous beliefs, we can damp down or alter excessive, inappropriate emotional reactions” (p. 214) and: “First he [the patient] has to become aware of what he is thinking. Second he needs to recognize what thoughts are awry. Then he has to substitute accurate for inaccurate judgments. Finally he needs feedback to inform him whether his changes are correct” (p. 217). We start this process by developing a formulation of the patient’s difficulties. This is an attempt to match theory to practice in the individual case and so avoid a “one size fits all” approach to treatment. The distinction between theory and formulation is highlighted by Butler (1998): “A theory is the source of general explanation and general hypotheses, whereas a formulation is specific to the person to whom it applies and therefore is the source of more specific explanations and hypotheses . . .” (p. 4). It involves developing an understanding of a patient’s own thoughts, behaviors, and moods concerning tinnitus, and the links between these factors, within the cognitive-behavioral model of emotion. Constructing a formulation is different from making a diagnosis or categorizing a patient. Allocating a patient to one or another category, particularly on the basis of a checklist approach to categorization, rarely informs the therapist or patient about why that particular patient’s problems have come about. Within CBT it is not enough to know that a patient can be categorized as having tinnitus and as being anxious; it is imperative to know why that particular patient is anxious; that is, what thoughts have led to the anxiety and what mechanisms are maintaining it. It is particularly important to highlight vicious cycles in the system.

In Albert’s case, his belief that everyday noises would permanently worsen his tinnitus led him to avoid noise whenever possible. This in turn led him to become increasingly anxious and increasingly sensitive to sound. His avoidance did not allow him to do things that would disconfirm his beliefs about the relationship between noise and tinnitus; by avoiding noise, his (misguided) logic helped him to maintain his beliefs and the behavior that those beliefs generated. It is best to develop a formulation collaboratively with the patient rather than impose it in an authoritative manner. An explicit understanding of these processes
ensures that both patient and therapist can be clear about what needs to change and helps to maintain the patient in a collaborative role within the therapy. Developing a formulation helps patients understand that their problem is one of, say, anxiety about tinnitus as opposed to the simple presence of tinnitus.

Although we have said that the aim of treatment is simply to replace inaccurate or unhelpful beliefs with more accurate or helpful ones, it is important to reiterate the point that in tinnitus management the aim is to modify the person’s appraisal of the consequences, meanings, and implications of tinnitus. There is not a strict procedure for achieving this, and guidance on how to challenge automatic thoughts can be found in the literature (e.g., Beck, 1995; Wells, 1997). The two broad methods of challenging thoughts are through verbal reattribution and through behavioral reattribution. Verbal reattribution can be achieved by techniques such as questioning the evidence supporting negative thoughts. Questions such as, What is the evidence that [a disaster] will happen? and What makes you think that? can be helpful in this respect. Often, however, patients do have some evidence for their beliefs, and it is best not to engage in a head-on confrontation but rather discuss what evidence the patient does have for a given belief and to examine the quality of that evidence. This can be achieved by considering alternative explanations for patients’ observations about what is happening to them and through reviewing counterevidence.

In the case of Albert, two possible explanations were considered for the observation that his tinnitus became more intrusive when he was exposed to everyday loud noises. The first possible explanation was that noises permanently exacerbated his tinnitus; the second possible explanation was that he became anxious when he encountered noise, and that this anxiety made his tinnitus more intrusive. These possible explanations were labeled 1 and 2. Albert was asked to think of evidence in support of explanation 1. He said only that his tinnitus became more intrusive when he was exposed to noises. When asked for evidence in support of explanation 2, he remembered that he did have negative thoughts about noise making his tinnitus permanently worse when in noisy situations, and he had experienced an increase in the intrusiveness of his tinnitus when he became anxious about his tinnitus in the park where the level of ambient noise was not high. He also said that although his tinnitus became more intrusive at times, it always receded again, disproving the “permanent” aspect of his negative thoughts. Albert realized that explanation 2 was much more likely to be the true explanation for his experiences. He found this process of considering a different possible explanation for his experiences helpful and reported a reduction in his anxiety at the time. For Albert this process was important in removing one roadblock to the process of habituation. After reviewing the evidence for and against a particular belief or challenging it in some other way, it is important to conclude by producing a rational response to the negative thought.

Some patients may be reluctant to even engage in cognitive therapy. This may be because they believe it to be an inadequate way of managing tinnitus and instead think that only a medical cure will suffice. For such patients it may be useful to do a cost–benefit analysis (or advantages–disadvantages analysis) of holding such beliefs. The belief is clearly stated, then a two-column table is constructed, with one column labeled “Costs” or “Disadvantages” and the other column labeled “Benefits” or “Advantages.” The patient is then asked to think
of ways in which holding the belief is advantageous. For example, it may emerge that the patient holds the belief “Settling for treatment that is not a cure means I will stop fighting tinnitus and I will have lost the battle.” Challenging this belief may allow the person to engage in treatment or become more compliant with it. The second step is to list the disadvantages of holding a particular belief. An effort should be made to generate more disadvantages than advantages, but the advantages and disadvantages may be weighted numerically and the total weight of advantages and disadvantages compared.

Altering patients’ negative automatic thoughts is likely to lead to symptomatic relief. After this has been achieved, it may still be necessary to address the patient’s rules, assumptions, and beliefs. These deeper cognitive structures may be challenged in the same way as negative automatic thoughts. For example, the evidence for and against the beliefs revealed at each stage of the vertical arrow technique can be reviewed. Another technique that was used in Albert’s case was that of constructing a continuum with which to consider his assumption that if he was anxious, he would be out of control, and his corresponding rule that he should always be in control of his emotions. First he was asked to describe the characteristics of someone who was totally out of control of his emotions. He was then asked to describe how a person would be if he were totally in control of his emotions. These descriptions were used to label either end of a continuum. He was then asked to describe the characteristics of people who might fall at intermediary points on the continuum (e.g., at 40% in control and 60% in control). When he did this, he could see that he had most of the qualities of someone who was 60% in control. He also conceded that he did not actually know anyone who was 100% in control of his or her emotions; importantly, he realized that his father certainly did not match that description. He also said that he would not actually wish to be someone who is 100% in control of his emotions because this would mean that he would not be very human and probably not very attractive. Following this, he did not become so anxious about being anxious, and he found it easier to control his reactions to tinnitus.

**Behavioral Experiments**

There are several ways that behavioral tasks are used in cognitive-behavioral therapy. They may be used to distract the patient from anxiety or to help focus attention away from tinnitus, as described elsewhere in this chapter. They may be used to build up levels of activity in an otherwise inactive patient and in so doing increase the rewards that the person gets from life. This may help combat depression or provide the person with greater resources for coping with tinnitus. One of the most important uses of behavioral tasks, however, is to bring about change in the person’s cognitions. We therefore use behavioral tasks or experiments to challenge patients’ beliefs or test their predictions and to help them adopt more helpful ones.

In Albert’s case, behavioral experiments proved crucial in modifying his beliefs about tinnitus. As noted, he realized that his tinnitus became more intrusive when he became anxious, and that this usually happened at the same time as exposure to environmental noises. This intellectual understanding, however, did not relieve all of his anxiety. His emotional understanding of the point did not match his intellectual understanding of it. An experiment was therefore designed to test the
hypothesis that noise exacerbated his tinnitus. It was suggested that when next confronted by everyday loud noise, he would not follow his inclination to escape from the situation but would remain in the situation for a period of at least 5 minutes. Another experiment was designed to test the hypothesis that anxiety, particularly negative thoughts, worsened his tinnitus. It was suggested that he lie on his bed, in the absence of loud noises, worry about his tinnitus, and observe the consequences. It was agreed that he would do the second experiment first, because he regarded the first as risky. Albert observed that worrying about his tinnitus had the effect of making it more intrusive; he also observed that the intrusiveness of the tinnitus subsequently diminished when he became distracted by other events. He realized that negative thoughts were the causal agent because he had controlled the ambient noise levels. He found this very convincing evidence and reorganized the other experiment such that he sought out a noisy situation by going to a movie theater (something he had previously enjoyed but had stopped doing). He observed that his tinnitus became only marginally more intrusive following the movie, and he attributed this to having to monitor its level for the experiment; he again noticed that the intrusiveness quickly diminished. These experiments led Albert to accept hypothesis 2 and reject hypothesis 1. As a result, he quickly became less avoidant and again became involved in his previous activities in turn weakened the image of himself as an invalid. These behavioral experiments finally removed the roadblocks to his habituation. According to Wells (1997) and Bennett-Levy et al (2004), the most significant changes in a person’s cognitions are brought about as a result of behavioral experiments. Bennett-Levy et al (2004) give detailed guidance on the design and implementation of behavioral experiments in cognitive therapy.

By the end of therapy, Albert described himself as no longer anxious about his tinnitus and no longer leading an avoidant lifestyle. At that point his scores on the questionnaire measures of emotional state were within normal limits, and his score on the Tinnitus Questionnaire (TQ; Hallam, 1996) reflected a very mild degree of tinnitus complaint. He made a gradual return to work toward the end of therapy.

Conclusion

In this chapter we have placed the cognitive-behavioral approach to tinnitus within the general framework of the habituation model. We advocate a stepped approach to management (i.e., screening/assessment, information/education, brief cognitive-behavioral therapy protocol, and longer cognitive-behavioral therapy). Although the majority of tinnitus patients can be accommodated within a relatively standardized approach, there is a sizeable minority that require careful formulation and a tailoring of techniques to their specific problems. It is desirable that this service be provided within an audiological setting where medical and audiological services and additional rehabilitation techniques are available.

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Tinnitus-Related Insomnia Treatment

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The term insomnia covers a range of sleep-related complaints including sleep of insufficient duration, quality, or effectiveness. Like tinnitus, insomnia is very prevalent in the general population (Shapiro and Dement, 1993). Arguably, sleep disturbance is the single most important aspect of tinnitus complaint among adults (McKenna, 2000) and among children (Gabriels, 1995; Kentish et al, 2000). There is evidence that when associated with sleep problems the experience of tinnitus is more distressing (Axelsson and Ringdahl, 1989; Folmer and Griest, 2000; Hallam, 1996; Scott et al, 1990). There is an obvious need to address the issue of tinnitus-related insomnia and its management, but to date few articles have had this subject as a central focus (McKenna, 2000).

The Cognitive Behavioral Model Applied to Tinnitus and Insomnia

There are strong arguments against pharmacological treatment of insomnia (Espie et al, 2001), and psychological management is increasingly recognized as the treatment of choice. The authors facilitated a psychoeducational group for people with tinnitus and sleep problems. It was based on the cognitive-behavioral model, which focuses on the interactions between our environment, thoughts (or cognitions), emotions, behavior, and physical reactions (Greenberger and Padesky, 1995).

Applying the cognitive-behavioral model to tinnitus suggests that the thoughts people have about their tinnitus, rather than the tinnitus per se, determine their level of distress. Thinking of tinnitus as “just a noise” that will not result in physical or emotional harm is unlikely to lead to distress. Conversely, construing tinnitus as a threatening and unmanageable condition will almost certainly lead to distress and greater difficulty in coping with it. The behavioral component of the cognitive-behavioral model suggests that the way a person behaves also influences well-being; a person may do things that exacerbate distress, or avoid doing things that alleviate the problem.
The cognitive-behavioral model has also been applied to insomnia (Harvey, 2002a). It has been suggested that people with insomnia suffer from excessive negative thoughts both while trying to go to sleep and during the day and that as a consequence they change the way they behave. The negative thoughts and changed behavior lead to increased arousal, making sleep less likely, and so a vicious cycle is established. Cognitive and behavioral interventions have been found to be helpful in the management of insomnia (e.g., Espie et al, 2001; Harvey et al, 2002; Morin et al, 1999, 2000). Many studies have pointed to the benefits of a cognitive-behavioral approach in tinnitus management (Andersson and Lyttkens, 1999; Henry and Wilson, 1999; Jakes et al, 1986, 1992; Sweetow, 1989). Unfortunately, these studies have shown little benefit on the insomnia component of tinnitus complaint (see McKenna, 2000, for a review). The interventions used, however, rarely if ever focused specifically on insomnia. This has been the inspiration for the authors’ decision to facilitate group therapy focusing specifically on sleep difficulties in tinnitus patients.

It is our view that tinnitus is not a specific sleep antagonist. Rather, the cognitive-behavioral model of insomnia can be applied to the person with tinnitus who suffers from poor sleep. Our hypothesis is that anxiety associated with tinnitus, and with poor sleep, leads to insomnia. A vicious cycle of anxiety, tinnitus, and poor sleep is established. It is common for anxiety about either the tinnitus or poor sleep to assume dominance, and there may be variation in the extent to which each component of the anxiety is present. Many, but by no means all, of our patients have some previous history of sleep difficulties. Our suggestion, based on clinical observation, is as follows: (1) A person may become aware of tinnitus when trying to sleep, or go back to sleep, because the presleep period, with its few other distractions and low levels of ambient noise, offers an opportunity to focus on tinnitus. (2) This leads to unhelpful cognitions about tinnitus and to changes in behavior (e.g., delaying going to bed where tinnitus is more intrusive, drinking alcohol, and checking tinnitus), increased arousal, and distress. (3) This anxiety leads to poor sleep. (4) The sleep difficulties give rise to anxiety again in the form of unhelpful cognitions about sleep, to changed behavior, and to increased arousal and distress. (5) This anxiety maintains the insomnia and leads to greater awareness of tinnitus. (6) Poor sleep maintains the environment that fosters continued awareness of tinnitus (Fig. 7–1). We envisage the process as akin to the “hot cross bun” cognitive-behavioral model of emotional problems described by Greenberger and Padesky (1995) and Williams (2001). We recognize that many of our patients suffer from significant levels of depression, but it is our observation that anxiety processes are the key factors in determining our patients’ poor sleep; it may be that the anxiety represents an aspect of depression in many cases.

**Group Therapy for Tinnitus-Related Insomnia**

In our clinic we offer both group therapy and individual therapy for insomnia. The focus of this chapter is a description of our group therapy approach for adults with this problem. Individual therapy does not differ fundamentally from the group therapy approach, although it can permit a greater flexibility for people whose problems are multifactorial or who, for some reason, do not meet
our group therapy selection criteria. Once the group has commenced, there is no opportunity for others to join the sessions. A new member entering after the first few sessions will gain little benefit because the content of the sessions builds on the knowledge gained in previous sessions. A closed group can enable cohesion to build between group members and may engender a feeling of trust and confidence in the group, enabling members to speak more freely. Individuals in the group have the advantages of meeting and listening to others who are in a similar situation, which can normalize a person’s experiences and reduce anxiety. Patients also can serve as role models for each other. A group milieu may reduce any tendency for patients to dispute the therapist’s ability to understand or help because the therapist does not have tinnitus. Such assumed differences can become barriers to the therapeutic process. From a service perspective, group therapy can be cost effective and may result in more patients receiving the required treatment. Nonetheless, care needs to be taken that the group setting does not lead to disadvantages. Jakes et al (1992) suggested that observing other group members improving may elicit helplessness and envy in some people, or confirm to a patient that his or her problems are unique and therefore much harder to address. In addition, the group environment may result in reinforcement of each others’ negative opinions. It is our practice to use two therapists in each group to help safeguard against such difficulties.

**Patient Selection Criteria and Definitions**

The problems of insomnia include difficulty falling asleep (initial or early insomnia), waking in the middle of the night and having difficulty returning to sleep (middle insomnia), and waking too early in the morning (terminal or late insomnia). Problems with the quality of sleep translate into complaints of sleep being light, broken, or restless, and not being restorative or refreshing.
Complaints about associated daytime problems such as tiredness or sleepiness, mood disturbance, and poor performance are also common.

The quantity of sleep a person gets is not an accurate guide to whether sleep will be regarded as problematic. Some of our patients complain of poor sleep while reporting that they get 8 or more hours of sleep a night; others manage well on little sleep. Subjective complaint about sleep is therefore a key factor in the clinical consideration of sleep problems. To obtain some measure of objectivity, we follow guidelines that are set out in the insomnia literature. We regard sleep as problematic if there is a delay in getting to sleep, or in getting back to sleep in the middle of the night, of at least 30 minutes, or if the total time awake in the middle of the night is 45 minutes, or if the person obtains a total of less than $6\frac{1}{2}$ hours sleep (Morin, 1993). These difficulties should occur at least 3 nights a week. In practice many of our patients complain of daytime problems due to insomnia, but we do not regard such complaints as necessary for inclusion in our sleep management program. Sticking to criteria that are rigidly based on time or frequency alone can be problematic. Considerable variability in sleep patterns is seen not only in the general population but also in people complaining of insomnia, and the unpredictability of sleep may be as much a feature of insomnia as a lack of sleep. The importance of complaints about insomnia is therefore often a matter of clinical judgment. Nonetheless, adherence to the time and frequency criteria results in greater homogeneity in the group and avoids the inclusion of people with problems that others regard as implausible.

Another important criterion in our selection process is the establishment that the insomnia is related to the person’s tinnitus. Insomnia, like tinnitus, is a symptom rather than a single disorder, and it can occur for a variety of reasons. Dement and Vaughan (1999) list disruption of the circadian rhythm and psychological disorder as among the main causes of persistent insomnia. Both of these problems are commonly reported by our sleep-disturbed tinnitus patients. Provided the psychological disorder is related to the patient’s struggle with tinnitus or the circadian rhythm disturbance is a result of, say, their inappropriate efforts to deal with their insomnia, rather than due to something like shift work, then such patients are included in our group. Restless legs syndrome, periodic limb movement disorder, gastroesophageal reflux, and fibrositis syndrome or other pain states are also possible reasons for persistent insomnia (Dement and Vaughan, 1999). Breathing disorders are also a common cause of insomnia (Williams, 1996), and it is possible for some medications to disturb sleep by producing arousal or by disturbing the phases of sleep (Idzikowski and Shapiro, 1993). Alcohol and illicit drug abuse also can lead to sleep disturbance. We suggest that therapists bear these things in mind when assessing people complaining of tinnitus-related insomnia and if necessary refer the person on appropriately.

Our sleep management program employs psychological rather than pharmacological treatment; however, many of our patients are already taking hypnotics or other psychotropic medication that affects sleep. We request that patients do not alter their medication during the program, unless there is a clear indication that they are taking the medicine inadvertently improperly, or unless a reduction in dose is established as a specific therapeutic goal. In such cases reference is made to the prescribing physician. We do not include people who are significantly abusing alcohol. Many of our patients, however, use alcohol as a sleeping agent,
and inclusion or exclusion from our program is dependent on whether the primary problem is the insomnia or the alcohol use. To obtain some homogeneity, we restrict membership of the group to the adult population, (i.e., 18–65 years of age). Older adults are seen on an individual basis.

Assessment

QUESTIONNAIRE MEASURES

Several questionnaire measures are used in the evaluation of our therapy. They are administered 1 month before the start of the therapy, at the start of the therapy, at the end of the therapy, and at a 4-month follow-up. The second edition of the Beck Depression Inventory (BDI-II; Beck et al, 1996) and the Beck Anxiety Inventory (BAI; Beck and Steer, 1990) are used as measures of emotional state, the Tinnitus Questionnaire (TQ; Hallam, 1996) as a measure of tinnitus complaint, and the Pittsburgh Sleep Quality Index (PSQI; Buysse et al, 1989) as one measure of sleep. The PSQI assesses sleep quality during the previous month in terms of seven components: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medications, and daytime functioning. The seven component scores are then summed to yield a global PSQI score. A disadvantage is that it involves retrospective and somewhat global judgments about sleep that may be subject to reporting biases. An advantage of the PSQI is that it assesses sleep across a range of dimensions, has a high specificity, and is easily administered.

SLEEP DIARY

Sleep diaries used on a nightly basis are the most sensitive self-report instruments for assessing insomnia. They are useful in providing information about the person’s sleep habits and about the areas that require therapeutic intervention. A diary also provides a measure of progress. The diary should ask the person to record information about the time of going to bed, the time when the lights are turned out (i.e., the point at which an attempt is first made to sleep), the number of times the person wakes during the night, the amount of time the person is awake during the night, and the times of final waking and rising. From this the total time in bed and the total sleep time can be derived and a measure of sleep efficiency (the total sleep time expressed as a percentage of total time in bed) calculated. It is also useful to include a measure of sleep quality; this can be done using a 10-point numerical scale, where 0 equals very poor quality sleep and 10 equals very good sleep. Similar scales can be used to assess nightly tinnitus annoyance and daytime functioning. An example of a sleep diary used in tinnitus management is given by McKenna (2000). It is our practice to summarize key aspects of the diary data in graph form. The data chosen depend on the individual patient’s presentation, but typically time in bed and time asleep, or time asleep and quality of sleep, are chosen. The graphs are updated as each new diary is presented and are provided to the patients as a source of feedback. Summary data in terms of mean values can be calculated for final evaluations.
SLEEP NARRATIVE

Patients are asked to give an account of their sleep and sleep-related behavior for a typical 24-hour period. They are asked to describe their preparations for bed. Patients’ bedtime and activity prior to lights out (e.g., reading in bed, watching television in bed) are noted. Patients are asked about their presleep experiences (e.g., checking tinnitus, worrying about the next day), the length of sleep, the timing and duration of any awakenings, what they do during awakenings, final waking times and rising times, and daytime activity, including any naps and any other activity that relates to sleep (e.g., exercise to tire the person out). The story is taken up to the time of preparing for bed the next night. This account highlights the areas in need of intervention; for example, intrusive ruminations and long delay in initial sleep onset and sleeping late in the day.

Group Structure

Our groups comprise 8 to 10 patients. This number of participants allows time to address individual problems within the group, to prevent the quieter members from feeling overwhelmed, and to help the group feel contained. The group runs for 2 hours every 2 weeks. There are eight sessions and one follow-up session at 4 months. The group sessions begin with individual members introducing themselves and giving a brief account of their experience of tinnitus and sleep problems. At this stage patients often state their individual treatment goals; however, goal setting is returned to following some basic sleep education. The introductions are followed by an educational component informing people about sleep, insomnia, and tinnitus. This is followed by the introduction of relaxation techniques and then by the introduction of the cognitive model. Sleep hygiene strategies are then introduced, and later on other techniques for the control of intrusive cognitions while in bed are described. The information provided is supported by handouts, and the participants are given pen and paper to make notes and thus build up a folder to use as a written summary for future use. Cognitive restructuring, relaxation, and sleep hygiene homework are reviewed in each session.

Treatment Protocol

TINNITUS AND SLEEP EDUCATION

Following the introductions, the program moves on to an educational component. This seeks to inform the group members about the nature of tinnitus and about the nature of sleep and insomnia. The intention is to demystify tinnitus and sleep and to provide a framework against which to normalize some of the patients’ experiences (e.g., frequent awakenings) and within which to set realistic goals.

Information about Tinnitus  The information provided about tinnitus is based on the habituation model described by Hallam et al (1984). Emphasis is placed on the ideas that the natural history of tinnitus is one in which most people stop responding to tinnitus with the passage of time, and the majority of people who have tinnitus are not greatly distressed by it. Stress is also placed on the ideas
that high levels of arousal (or “tension”) and beliefs about tinnitus impede the process of habituation and that the physical parameters of tinnitus are relatively unimportant.

Information about Sleep and Insomnia  The sleep education element is derived from psychological writings within the insomnia literature (e.g., Espie, 1991; Morin, 1993) and in particular from a cognitive-behavioral model of insomnia (Harvey, 2002a). Therapists should acquire some basic knowledge about sleep and insomnia before offering a sleep management program to tinnitus patients. At this stage the information presented is restricted to several points about sleep stages, normal sleep times, and the effects of sleep deprivation.

Normal Sleep Times and Sleep Stages  Most people get 7 to 8 hours sleep. There is, however, a considerable range in normal sleep times. We illustrate the point that some people manage well on little sleep by reference to a high-achieving person such as former British prime minister Margaret Thatcher, who famously got only 4 hours of sleep a night. It is a commonly held belief that older people do not need as much sleep as they did when younger. Although older people do tend to get less sleep at night, they also nap more in the daytime, so the total amount of sleep achieved remains relatively stable from middle age to later life (Morin, 1993; Reynolds et al, 1985). An attempt is made to normalize the experiences of the group members by reference to the literature.

Sleep stages—rapid eye movement (REM) sleep and non-REM stages 1 to 4—are described, and the cycle of REM and non-REM sleep throughout the night is outlined. Patients are informed that this cycle takes about 90 minutes to complete but can vary from 70 to 120 minutes; the cycle is repeated four or five times a night in normal young adults. A normal night’s sleep also includes several awakenings. These are usually brief, and many people are unaware of them. For most people the first awakening occurs after 2 or 3 hours of sleep. Awakenings become more common as the hours of sleep increase. The first awakening often represents a point at which the structure of sleep changes, with the periods of REM sleep becoming longer. Clinically, the experience is often described in terms of little really deep sleep after the first awakening. Age-related changes in sleep patterns are described. Older people experience less deep sleep; very deep sleep may be absent altogether in older people, and the number of awakenings increases with age. Young adults commonly experience two awakenings in a normal night’s sleep; older people may experience as many as nine awakenings a night. For many elderly people sleep is experienced as light and fragmented. This information is illustrated by using a histogram representation of sleep stages (McKenna, 2000) and by reference to the experiences of the group members. Many people find it difficult to clearly distinguish sleep from wakefulness. This difficulty may be accounted for by the observation that people may continue to think about things even during periods of light sleep; mental activity is mistaken for wakefulness.

Effects of Insomnia  The exact function of sleep remains unclear (Shapiro and Falnigan, 1993), and it is more helpful to consider some of the commonly reported difficulties associated with the lack of sleep rather than to discuss the possible function of sleep. People with insomnia complain of a range of deficits, such as daytime sleepiness, poor concentration and memory, and poor performance on daily tasks. The literature on the effects of insomnia does not
lend strong support to the idea that insomnia does lead to these deficits. Individual insomniacs vary in their ability to do tasks, and some research studies have found no difference between insomniacs and people who sleep well on psychological tests (Chambers and Keller, 1993; Mendleson, 1990; Mendelson et al, 1984; Schneider-Helmert, 1987; Seidel et al, 1984; Sugarman et al, 1985). Even the idea that insomnia leads to greater daytime sleepiness has been questioned (e.g., Dement et al, 1982; Stepanski et al, 1988). A review by the American Academy of Sleep Medicine (Sateia et al, 2000) concluded that the negative effects of insomnia seem to be caused as much by the anxiety surrounding it as by the sleep loss per se. A discussion of these points is encouraged, and again an attempt is made to relate patients’ experiences to the evidence in the literature. Patients may be skeptical about these ideas, and knowledge of the literature may be vital for the therapist’s credibility. Notwithstanding this, it is our experience that formulating their problems in terms of the effects of increased arousal is credible to most patients.

**Tinnitus and Sleep**  Patients are asked to consider the fact that tinnitus does not lead inevitably to one or another negative consequence. The varying experiences of the group members are drawn upon to illustrate this. The point is then made with reference to tinnitus and insomnia. The group members are informed that only about half of people attending a tinnitus clinic complain of sleep problems. Emphasis is placed on the idea that tinnitus does not inevitably lead to insomnia. The factors that give rise to, and more importantly that maintain, insomnia are highly likely to be psychological in nature and susceptible to psychological treatment. It is our observation that our patients awaken in the night at about the times predicted from a typical sleep cycle, and it is our contention that tinnitus does not wake people up. Once awake, tinnitus may be the first thing that a person is aware of, and he or she may then remain awake for the reasons previously described. We stress the point that we do not view tinnitus as a specific sleep antagonist.

**INDIVIDUAL GOAL SETTING**

Formal research programs commonly use sleep-onset latency (i.e., the time taken to fall asleep) as a clinical effectiveness measure (see Espie, 1991, for definitions). When it comes to the individual patient, however, greater care is needed in setting treatment goals. Given the subjective nature of insomnia, it is clearly inadequate to set a standard goal for all patients, even to the extent of suggesting that an increase in the amount of sleep obtained should be the goal. Patients’ aspirations for treatment are highly individualistic, and imposing standard outcome criteria is likely to lead to a sense of failure for both patients and therapists. Many patients do hope for an increase in the number of hours of sleep obtained, but many other, equally valid, goals are expressed by patients. These may include sleep without the aid of alcohol or pills, fewer awakenings or improved sleep efficiency (time asleep as an expression of time in bed), more predictable sleep, better quality sleep, a reduction in daytime deficits, and feeling less anxious or depressed. The therapist must consider the individual goals against what is known about normal sleep and against what is possible within the clinic setting and the time available. For example, a goal of 8 hours of uninterrupted deep sleep for a 60-year-old patient may be unrealistic.
RELAXATION

Patients are given a rationale for relaxation therapy in terms of reducing autonomic nervous system arousal. The reduction of muscle tension provokes a similar reduction in other autonomic subsystems, such as heart rate, respiration, and blood pressure. Elevated levels of arousal decrease the likelihood of initiating sleep, and relaxation therapy increases the chances of sleep. Muscle relaxation also has been found to be effective in reducing intrusive thoughts (Nicassio et al, 1985; Sanavio, 1988). It has been suggested that the experience of tinnitus is related to heightened levels of autonomic arousal (Hallam et al, 1984) and that by reducing the level of autonomic arousal, the intrusiveness of tinnitus may also be reduced. Relaxation therapy has considerable face validity, and it may be that some of the benefit derived from it stems from the sense of control that people commonly report when practicing it. We believe that the provision of a clear rationale may enhance the face validity, thus promoting these nonspecific effects and encouraging compliance. By distinguishing relaxation therapy from other activities commonly thought to be “relaxing” (e.g., watching television, reading a novel), the rationale may also reduce these alternative, possibly arousing behaviors. Muscle relaxation exercises are taught in the group, and patients are given recorded relaxation instructions and asked to practice daily.

COGNITIVE THERAPY

The cognitive therapy element focuses on the process of cognitive restructuring. The initial aim of this intervention is to help people understand the relationship between thoughts, emotions, behavior, and bodily sensations. This is achieved by using simple illustrations that demonstrate the link between thoughts and emotions; for example, a friend does not say hello because (1) he is ignoring you, resulting in emotional upset, or (2) he does not see you, resulting in a less distressing emotional state. Once this basic relationship is understood, the point is reiterated with reference to the way unhelpful thoughts about tinnitus and poor sleep contribute to a cycle of distress, increased tinnitus perception, and poor sleep. The patients are asked to think of ways in which their own thoughts contribute to their experience of distress. Initially, the therapist may help by pointing out the thoughts that patients have expressed when relating their history and if need be may help patients in other ways, such as the use of imagery, to access their thoughts. The process of cognitive distortion, wherein thoughts acquire an overly negative bias, is also described and illustrated. The patients are asked to monitor their emotions and thoughts using diaries as a homework task (Greenberger and Padesky, 1995). This helps to consolidate the information learned in the session and encourages group members to begin to recognize their unhelpful thoughts. The next step is to help people begin to reevaluate these unhelpful thoughts. The role of the therapist is to help patients consider alternative and more helpful thoughts about their situation. There are many questions people can ask themselves in an attempt to consider a different perspective about a situation; for example, What’s the evidence for my thoughts? (very often it is scarce) and Is my thought fact, or is there another way to think about this? (see Greenberger and Padesky, 1995). Once the conviction in the initial thought is weakened, the person is encouraged to think about another way of viewing
the situation. For example, rather than thinking I’ll never get to sleep and won’t be able to do anything at work tomorrow, it may be more helpful to think I’ve never had a night when I haven’t slept at all, and I’ve always been able to do something at work even when I’ve been very tired. It is important that these new thoughts and beliefs are tested, and work done outside the group is reviewed within the session. For example, with the above situation, the person may be encouraged to record what he or she does at work. This will help to provide evidence against the biased belief that the person will not be able to do anything and collect evidence in support of the new belief.

VIDEO MODELING

There is evidence that seeing other people cope with a problem can be therapeutic for patients with some psychological problems. The present authors are not aware of any studies that have formally employed coping models in tinnitus management, but Davies and colleagues (1995) postulate that improvements in tinnitus patients undergoing group therapy may be due to the modeling seen in group environments. We therefore show recorded interviews with past patients who had a history of considerable tinnitus-related suffering, including insomnia, but who are now coping well following psychological treatment. In our experience tinnitus patients hear that others cope with tinnitus, but they rarely encounter such coping models. Our intention is to provide evidence that tinnitus and insomnia can be managed and to provide a model that the patients can emulate.

SLEEP HYGIENE

As the cognitive model suggests, thoughts and feelings influence people’s behavior. When people have difficulty sleeping, they do things that they believe will help them sleep. Such strategies include taking medication or drinking alcohol, avoiding going to bed, remaining in bed for long periods of time, and watching television in the bedroom. These strategies may offer short-term benefits, but in the long term they may perpetuate the insomnia (Spielman and Anderson, 1999). As long as the person continues to attribute sleep difficulties to the tinnitus rather than to these behaviors, he or she will unwittingly reduce the chances of sleep, and so a cycle is established. Helping the person with insomnia to gain insight into this cycle is the first intervention step. Once the group members have begun to question some of their behaviors, the next step is to discuss sleep hygiene and the behavioral changes they can begin to make to promote sleep. Sleep hygiene interventions must be considered for all people who have poor sleep because even if poor sleep hygiene is not the primary cause of sleep disturbance, it may be a secondary factor that is playing a role in maintaining sleep problems (Spielman and Anderson, 1999).

Alcohol  Alcohol may help to induce sleep, but it can also cause sleep disruption throughout the night, especially the second half. The result is early morning wakening. Patients are encouraged to avoid using alcohol as a sleep or relaxation aid.

Caffeine  Although it is widely known that caffeine is a stimulant, many people drink tea or coffee before going to bed or if they wake in the night. People are
advised to reduce their caffeine intake slowly, to avoid it in the evenings, and to be aware that it is present in a range of foods and drinks (e.g., chocolate, cola drinks).

**Nicotine**  People often have a cigarette before bed or when they wake up in the night. As with alcohol, they may be viewing cigarettes as a means of relaxation. People are advised about the physiological stimulating effect of nicotine and advised to reduce and carefully regulate their intake.

**Food**  Hunger can result in difficulty initiating sleep, but so too can a heavy meal near bedtime. It is important to gain a balance between going to bed hungry or with a full stomach. People are advised not to eat while awake in the night.

**Evening Routine**  People are advised to have a prebedtime routine to help them and their body recognize that it is time to slow down, relax, and sleep. The routine can be very individual, and some of the sleep hygiene can be incorporated. It is helpful to discuss with people their plans for a new routine and to caution against potentially unhelpful behaviors. For example, people often think that a bath close to bedtime will help them to relax. Because of the changes in body temperature, however, it is more helpful to bathe about an hour before bedtime.

**Exercise**  Regular exercise helps well-being and promotes sleep. During and for some time following exercise, however, the body is in an increased level of arousal. It is therefore advisable to engage in regular exercise but not just before going to bed.

**The Bedroom and Use of Sound**  Activities in the bedroom other than sleep result in an association between these activities and the bedroom, thus lessening the association between the bedroom and sleep. People are advised to use the bedroom only for sleeping and sex. If they wish to watch television or read a book, for example, then it is best to do so in another room. Many patients use sound in the bedroom to alleviate their tinnitus. We discourage the use of radios or televisions for this purpose because of their potentially arousing properties, and instead suggest that people use other sources of sound such as commercially available noise generators. If, however, a radio is all that is available, we suggest that it is set to a nonstimulating program at a volume that prohibits hearing what is being said, or better still, to have it out of tune so a noise similar to white noise can be heard. We suggest that if sound is used it be maintained in the bedroom on a 24-hour basis so that it quickly becomes part of the bedroom environment, and any arousing effects are minimized. We discourage the use of sound to completely mask tinnitus because this is considered counterproductive for the habituation process.

**Clock Watching**  For people who have sleep problems, looking at the clock during the night may serve to increase anxiety or dread, decreasing the chances of sleep. The best strategy is not to have a clock in the bedroom, or to turn the clock away if an alarm is needed.
Time in Bed  There is a tendency for people who have sleep problems to spend long periods of time in bed in an attempt to compensate for the poor sleep. People are encouraged to spend no more time in bed than absolutely necessary to avoid associating bed with wakefulness and triggering a cycle of unhelpful cognitions and unpleasant emotions, thereby reducing the chances of sleep. It is suggested that people wait until they are feeling tired before going to bed. If they are unable to go to sleep or go back to sleep, it is suggested that after ~20 minutes they get up, leave the bedroom, and do something restful, avoiding any physiological or psychological stimulation. Once they feel sleepy, they should return to bed; if they are not asleep after another 20 minutes, the routine should be repeated. It is also suggested that people anchor the wake-up time to a regular time (even on weekends). This can be difficult to do, especially when someone has obtained only a small amount of sleep by the wake-up time, but it is crucial to maintain a helpful sleep–wake cycle. Sleeping during the day is discouraged for the same reason but also because it can be a type of safety behavior that prevents the person’s anxieties about poor sleep being challenged and disproved. If a person feels sleepy in the day, he or she should do something that is not conducive to sleep, such as going for a walk.

Worry Time  The role of unhelpful cognitions about sleep has been discussed. This can also be applied to other worries in the person’s life. As we are all aware, it tends to be the nighttime when our worries come into and remain in the forefront of our thoughts. Although this may not be helpful for everyone, a suggestion can be to allow a “worry time” in the early evening. During this time, people are encouraged to write down the thoughts that are causing them to feel anxious. They then write down possible solutions to these worries. Should they wake up in the night, they can then remind themselves that they have attended to these worries, have done all they possibly can, and tomorrow is the next time when they will consider them again.

OTHER METHODS OF CONTROLLING THOUGHTS

Unwanted and intrusive thoughts are believed to be one of the main reasons for a delay in going to sleep (Borkovec, 1982; Espie, 1991). It is therefore important to consider ways of tackling this problem, particularly as patients may make their own efforts to control their thoughts in ways that are ultimately unhelpful. Many patients say that they find it difficult to carry out cognitive restructuring exercises in bed, and indeed it can be argued that any attempt to do so reduces the chances of sleep. Attempts to suppress thoughts can lead to a rebound effect such that the thoughts become more present (Wegner et al, 1987), and it has been suggested that this is an important maintaining factor in anxiety (Salkovskis, 1989) and possibly insomnia (Harvey, 2002b). We suggest that people use imagery distraction techniques or articulatory suppression, a thought-stopping technique, to focus attention away from negative and arousing cognitions when in bed. In the use of imagery, we follow Harvey and Payne’s (2002) suggestion that the person imagine an interesting and engaging situation of his or her own choice that is pleasant and relaxing. The person is asked to avoid imagery that may lead to arousal. To aid the establishment of the image,
the person is asked to imagine it in the group and to give a detailed description of it. Articulatory suppression involves the constant repetition of an emotionally neutral, single-syllable word (such as the), at a rate that suppresses other thoughts; the syllable or word needs to be spoken subvocally rather than just imagined, and the person needs to concentrate on saying the word. It was argued by Harvey (2002b) that, theoretically, this technique represents thought suppression and may lead to rebound effects, increasing unwanted thoughts and therefore insomnia. This technique, however, has been reported by Levey and colleagues (1991) as having beneficial effects, and in line with this our own clinical experience is that one third or more of our patients report some benefit from using the technique. Patients also report that they pay less attention to their tinnitus while saying (subvocalizing) the word. Because of the possible counterproductive effects, we are careful to recommend that patients attempt this technique only in combination with a prebedtime session of cognitive restructuring or problem-solving exercises.

**Conclusion**

Complaints about sleep disturbance are ubiquitous in patients with medical problems and are a key feature in the presentation of tinnitus patients. It has been argued that improving sleep facilitates healing, well-being, and the ability to cope with illness (Shapiro et al, 1993). Improving the sleep of tinnitus patients may not “heal” tinnitus, but the other points in this argument seem as relevant to people with tinnitus as to those with other health problems. Overall, however, clinical effectiveness studies of psychological treatment for tinnitus have not produced encouraging results in the management of insomnia (Andersson and Lyttkens, 1999). Reviewing this area, McKenna (2000) noted that in many outcome studies no measures or only very crude measures of sleep disturbance were included. Even where some measure of sleep disturbance was included, treatments were rarely directed, specifically at insomnia management. As yet there is no published outcome study that targets tinnitus-related insomnia as the central variable, and that includes the sorts of measures that are commonly reported upon in the insomnia literature. This chapter describes the clinical approach employed by the authors in the management of tinnitus-related insomnia. The work is informed as much by the insomnia literature as by the tinnitus literature. Our central proposition is that tinnitus is not a sleep antagonist, but that both tinnitus distress and insomnia are provoked by a process akin to anxiety. As yet our assumptions have not been empirically tested, but our work is being systematically evaluated. It is possible at this stage to report only our most preliminary impressions. To date the vast majority of our patients report some benefit from the group therapy. Most achieve their treatment goals, although such goals vary considerably between individuals and are not restricted simply to increased sleep time.

**References**


CHAPTER 7  ■  TINNITUS-RELATED INSOMNIA TREATMENT  95


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This chapter describes the method of applied relaxation, which forms an integral part of a cognitive-behavioral treatment protocol. The treatment also includes cognitive restructuring, sound enrichment, hearing tactics, sleep management, and relapse prevention. The rationale behind the treatment approach and the effects of protocol are reviewed. Practical advice on how to implement applied relaxation with tinnitus patients is given.

**Applied Relaxation as Part of a Cognitive-Behavioral Approach to Tinnitus**

Cognitive-behavioral therapy (CBT) is a relatively brief psychological treatment approach directed at identifying and modifying maladaptive behaviors and thoughts by means of behavior change and cognitive restructuring. The focus is on applying behavioral and cognitive techniques in real-life settings and testing out coping strategies for facing difficult situations. Hence CBT concerns not only thinking differently about experiences but also changing habits and finding ways to master difficult situations (like silence for some tinnitus sufferers). One coping strategy is applied relaxation. Applied relaxation, as presented in this chapter, is derived from various applications of relaxation, but it is more of a psychological than a physiotherapeutic treatment method. The use of relaxation in CBT has a long history, and its efficacy has been supported by experimental studies (Öst, 1987). Unlike relaxation done by physiotherapists, the patient must use the applied relaxation method outside the therapist’s office. In cases where there are clear problems with the neck and so on, then the referring physician and a physiotherapist should be consulted.

Applied relaxation is a method by which the patient is taught to relax quickly and to use self-control over bodily and mental sensations (e.g., stress). The purpose of this relaxation is not to reduce tinnitus but to deal with the
consequences of it. The goal is to obtain a balanced and relaxed state of mind and
to break a vicious cycle of tension, leading to more focus on tinnitus. Learning the
applied relaxation technique is usually the first task that the patient is given in our
treatment protocol, and the technique has been used successfully since the early
1980s (Lindberg et al, 1984). The technique is taught in stages over four to six
sessions, and the last stage is practiced for the rest of the treatment once it is
mastered. Normally, four components are included: (1) progressive relaxation
(tense and release body parts), (2) release-only relaxation without tension, (3)
cue-controlled relaxation (controlled breathing), and (4) rapid relaxation in every-
day situations. Imagery techniques (e.g., imagining a beach) are taught in associ-
ation with the relaxation training. Although there has been little tinnitus research
to evaluate differences in effectiveness between different forms of relaxation in
treating tinnitus, there are some indications that applied relaxation is slightly
superior to other alternatives such as progressive relaxation (Davies et al, 1995).

Relaxation is relatively easy to learn, and it can be meaningful to learn this skill
apart from the effects related to tinnitus. Thus applied relaxation can be helpful for
dealing with stress and tension, working on other tinnitus-related issues such as
insomnia, and confronting problems less related to tinnitus such as headache and
back pain. However, although applied relaxation can be beneficial in many cir-
cumstances, there are some caveats. First, there are some people for which relax-
atation, at least initially, can be a very terrifying experience. Examples of relaxation-
induced panic have been reported in the literature (Heide and Borcovec, 1983).
Fortunately, this is very rare. We inform our patients about the potential
adverse sensation they might experience, so that feelings of elevated anxiety
will not come as a surprise. In addition, we know from the literature that it can
be a bad idea to try to relax under severe stress because the opposite may
occur: the patient may feel more tense than when he or she started (Wegner
et al, 1997). The solution lies in gradually approaching difficult situations and
learning first to relax under easier conditions. In this context the therapist needs
to be attentive to motivating factors because the patient may find that there is
no need to practice relaxation when he or she feels relaxed. Here, the therapist
may find it useful to compare relaxation with the effects of exercise, where it is
not useful to begin exercising by running a marathon.

There are, of course, indications when applied relaxation is more or less likely to
lead to an improvement (Linton, 1982). For patients with signs of stress, muscular
tension, and anxiety, applied relaxation is likely to be of help, but then resting and
a change of environment also are beneficial. Also, some patients, despite being
given a rationale for this treatment, may search for an alternative treatment,
believing that tinnitus will disappear, and that applied relaxation is therefore
not needed to make a difference.

One common misunderstanding of our approach is that relaxation is equivalent
to doing nothing and resting. This has to be corrected when describing the ration-
ale of the treatment. Applied relaxation is described as an active coping technique,
and the patient is gradually taught to quickly relax and to use self-control
over bodily and mental sensations (e.g., stress, irritation, worry, anger). The aim
is not to reduce tinnitus but to control its effects. Metaphors used to illustrate
this include the runner at the starting block. If she is too tense, she will jump
the gun; if she is too relaxed, she will have a slow start. Ideally, being in control of mental and bodily sensations while still focused on the task at hand is what is needed. Another metaphor (provided by a patient) is the man who is aiming with his rifle with the intention to shoot. If he is too tense, he will miss, but if he is too relaxed, he may also miss the target. Therefore, contrary to what is usually meant by being relaxed (e.g., on the sofa in front of the television), applied relaxation is not something to do while lying down, although this form of relaxation can be useful as well. Another important aspect of applied relaxation is that it is important not to restrict relaxation to the person’s own physical and mental sensations but also to include environmental aspects. The environment where the patient applies relaxation greatly influences the outcome. In fact, many patients tell us that they are relaxed in some situations (e.g., while on vacation), and this information is used to encourage the patient to work for incorporating some “holiday atmosphere” into daily struggles to cope with tinnitus. Therefore, in applied relaxation the analysis of difficult situations and situations in which it is easier to relax is important.

This chapter presents an overview of our CBT program. There are several components to it, but the focus here is on applied relaxation.

**Cognitive-Behavioral Approach to Tinnitus**

The cognitive-behavioral approach to tinnitus management is based on certain premises derived from CBT for other conditions, such as anxiety and depression (Persons et al, 2001), as well as research conducted with patients afflicted with somatic conditions, such as chronic pain (Philips and Rachman, 1996) and insomnia (Morin, 1993).

The following basic assumptions guide our practice and the treatment protocol described in this chapter.

Tinnitus can be viewed, at least partly, in terms borrowed from learning theory. Hallam et al’s (1984) psychological model of tinnitus suggested that the natural history of tinnitus is characterized by the process of habituation (a learning theory term). Hence factors that impede habituation (e.g., arousal and novelty) are important to investigate to understand tinnitus. More recently, Jastreboff (2000) developed a theory that relies on classical conditioning, (the notion being that tinnitus can be conditioned (associated) with fear (and other negative emotions), and that this conditioning does not necessarily need to occur on a conscious level.

The severity of tinnitus can be understood within a stress-diathesis model (Andersson and McKenna, 1998; Schulman, 1995). This model assumes that a “vulnerable” person may develop tinnitus distress following the onset of relatively soft tinnitus. A more stress-tolerant person may bear higher degrees of tinnitus before seeking help. It is necessary to point out that vulnerability does not necessarily connote “psychiatric disturbances.” In fact, in the clinic we sometimes meet highly successful individuals with remarkable achievements in life, and without any pretinnitus psychiatric or somatic problems, for whom tinnitus becomes the major stressor initiating problems at work and in the family.

Thoughts and beliefs about tinnitus are important and can strengthen the association between negative emotions and tinnitus. The meaning attached to
Tinnitus influences how annoying it is perceived to be. Sounds are perceived and processed by conscious and feeling individuals. In addition, from clinical reports we know that many tinnitus patients report difficulties with concentration. Hence it can be suspected that tinnitus demands attention. For example, in a recent experimental study we found that background sounds (white noise) were perceived as lower when attention was focused on tinnitus than when it was not (Andersson, 2002).

Finally, an important assumption is the simple notion that what is good for life in general is usually good for coping with tinnitus. This includes living a healthy life with respect to food, exercise, social contacts, and so on. One related aspect is that it may be important for the tinnitus patient to establish regular routines in life. Before the onset of tinnitus, it might have been possible to have irregular working hours and sleep patterns, but often adaptation to tinnitus requires regular habits, in particular when it comes to sleep.

In the context of changing beliefs and thoughts, it is important to work toward acceptance of tinnitus and to foster the idea that tinnitus is not worth all the attention it gets. The idea that acceptance of tinnitus is something to work for is not easy to convey. Some patients have had the bad experience of health care personnel telling them that tinnitus is something they have to learn to live with. For many patients this is true when it comes to the sensation of tinnitus, but it is not true when it comes to the accompanying annoyance and distress. What we tell our patients is that we want to give them tools to deal with the consequences of tinnitus and that this is a way to be able to accept that tinnitus seldom disappears by itself. We need to help our patients distinguish between useless attempts to try to control something that cannot be controlled (as often is the case with loud tinnitus), and successful ways of controlling their reactions and emotions when faced with difficulties (in this context, the consequences of tinnitus). So far, the notion of acceptance of tinnitus has received little attention in the literature, but in the day-to-day clinical practice this is something many of us work for. Some work has been done in the field of chronic pain, an area bearing several resemblances to tinnitus (Moller, 1997). For example, McCracken (1998) found that greater acceptance of pain was associated with reports of lower pain intensity, less pain-related anxiety and avoidance, and several other indicators of well-being in relation to chronic pain, and this was not a function of pain intensity. Experimental studies seem to support this notion (Hayes et al, 1999a). According to this way of thinking, acceptance of tinnitus can be defined as acknowledging that one has tinnitus, giving up unproductive attempts to control it, acting as if tinnitus does not necessarily imply disability, and being able to commit one’s effort toward living a satisfying life despite the problem (adapted from McCracken, 1998). According to Hayes et al (1999b), acceptance is often interpreted by the patient to mean tolerance, which is an entirely different thing, or resignation, in which the client accepts defeat. Acceptance has more to do with choosing the direction in one’s life.

**Treatment Protocol**

Basically, the application of CBT for tinnitus follows standard methods developed for other problems such as anxiety and pain (Hawton et al 1989; Philips and Rachman, 1996). Hence homework assignments between therapy sessions are scheduled, and
a rationale is presented for each treatment component. In addition, the therapeutic relationship between therapist and patient is collaborative, in the sense that the outline of each session (agenda setting) and the treatment as a whole are negotiated. Motivation to change habits and to alter behavior is crucial, and it is made clear to the patient that work is required for the treatment to have any effect.

All sessions follow a common structure, including check-in, agenda setting, review of homework and feedback, presentation of new material, and scheduling.

<table>
<thead>
<tr>
<th>Session</th>
<th>Activities</th>
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<tbody>
<tr>
<td><strong>Assessment</strong></td>
<td>Structured interview of tinnitus problems, related problems such as hearing impairment and noise sensitivity, and history; check of previous treatments and consultations for tinnitus and other conditions; assessment of available time needed to take part in the treatment; questionnaires given as homework assignments, including daily diary ratings for at least 1 week; rationale for the treatment; goal setting and decision regarding type of treatment (i.e., group, individual, or Internet)</td>
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<tr>
<td><strong>Treatment</strong></td>
<td>Feedback on functional analysis, home registrations, and questionnaires; repetition of treatment rationale and rationale for applied relaxation; in-session training of step 1, Progressive relaxation (tense and release body parts); progressive relaxation twice daily as homework for the next week; plan practice and prepare for problems; assessment of treatment credibility to bring back to next session</td>
</tr>
<tr>
<td></td>
<td>Review of homework and feedback; treatment rationale and rationale for applied relaxation; in-session training of step 1, Progressive relaxation (tense and release body parts); progressive relaxation twice daily as homework for the next week; plan practice and prepare for problems; assessment of treatment credibility to bring back to next session</td>
</tr>
<tr>
<td></td>
<td>Review of homework and feedback; tinnitus and environmental sounds; use of environmental “sound enrichment” strategies for facilitation of habituation to tinnitus (this may include tapes or CDs, but more importantly advice and analysis of fluctuations in tinnitus and the risk associated with trying to mask, i.e., cover the tinnitus. Later on, the effect of using sounds to cope with tinnitus is discussed, and the cognitive aspects of masking are covered, e.g., how masking of tinnitus and attention may interact); in-session training of step 2, Release-only relaxation without tension; instruction on how to use imagery techniques and in vivo presentation; release-only relaxation including imagery given as homework for the next week (2 times per day); registration of environmental sounds as homework</td>
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<tr>
<td></td>
<td>Review of homework and feedback; advice regarding hearing loss and remedy of this as far as possible. This includes not only referral for the fitting of hearing aid(s), but also behavioral advice in the form of “hearing tactics” (Andersson, 2000). These are not only for the individual but also directed to the people close to the patient. Sleep management advice given when needed (may result in extra session; see McKenna, 2000); positive imagery; in-session training of step 3: Cue-controlled relaxation (controlled breathing). Cue-controlled relaxation as homework (2–5 times daily) and other components given when indicated</td>
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(Table continued)
of homework for the next appointment. An outline of the protocol is given in Table 8–1. The treatment is presented in 6 to 10 sessions, meaning that it is possible to devote more than one session to each component. However, the present limit of the number of sessions given should be adhered to because there otherwise may be a risk of less focused and unproductive sessions.

## Structured Interview and Questionnaires

At least one otolaryngology consultation and audiological tests precede the first meeting with the patient. The latter includes audiogram, tinnitus masking level, and matching. The psychologist interviews the patient using a structured interview, including questions on tinnitus history, characteristics, psychological and physical consequences (e.g., sleep disturbance), exacerbating and relieving factors, related symptoms, and previous treatments (Andersson, 2001; Andersson et al, 1999). The aim of the interview is to establish a good therapeutic contact and to collect enough information to be able to decide if the patient is suitable or not for psychological treatment. This is typically done in the format of a functional analysis. In this context, functional analysis is a term used for collecting information about factors that influence the tinnitus annoyance, and investigating causal links between what the patient does and experiences and how tinnitus is perceived. This includes health, audiological, and psychosocial factors. Typically, 1½ hours is needed to interview the patient. In this first session a rationale is presented that incorporates the idiosyncrasies of the patient and also gives some preliminary
goals of the treatment (McKenna, 1987). Following the interview, it is decided whether treatment should begin or whether an alternative is more suitable.

Once the decision has been made to start treatment, the patient is given a questionnaire as the first homework assignment for the next session. Questionnaires can be divided into tinnitus-specific or more global devices, including those aimed at assessing psychological well-being and cognitive functioning. In this context, it is important to be aware of the special needs and circumstances surrounding the tinnitus patient that may affect the ability to complete an assessment. The most obvious example is hearing impairment, but there are other less conspicuous problems, such as fatigue, lack of motivation, and litigation status, that may affect the result. The psychological dimensions of tinnitus complaints are usually measured with self-report instruments specifically developed for use with tinnitus patients (Noble, 2000; Tyler, 1993). Validated measures of depression and anxiety can be useful when one is planning and evaluating the treatment (e.g., Beck et al, 1961; Zigmond and Snaith, 1983).

Daily diaries can be used in clinical practice to collect data on the characteristics of tinnitus. Tinnitus often fluctuates, sometimes even within a day, and occasionally this aspect of tinnitus is not clear to the patient. Daily diaries need to be easily comprehended and unobtrusive while still providing usable data. One alternative is the Visual Analogue Scale (VAS), which is a straight line, the end anchors of which are labeled as the extreme boundaries of the sensation, feeling, or response being measured (Wewers and Lowe, 1990).

**Tinnitus Education**

Information about tinnitus and a proper examination of potential causes and moderating factors are crucial. This should be familiar to all clinicians dealing with tinnitus, but lately it has become even more relevant, given the abundance of information about tinnitus provided by mass media and the Internet. Hence patients sometimes do not need more information, but rather advice regarding what information they should trust. Unfortunately, given the lack of knowledge regarding tinnitus (e.g., regarding prognosis), it is often difficult to give the patient definite answers (and if there are no answers, none should be given). CBT for tinnitus includes presenting information to the patient in a gentle and pedagogic manner. Early in the treatment many patients need help to sort out the different problems they experience, which may require different solutions. For example, hearing impairment is not caused by tinnitus, and it needs separate attention.

Preferably, the patient should be able to find out things on his or her own, and the therapist should not present information as hypotheses to be tested together with the patient, rather than as facts. Although the clinician should be careful not to adopt too much of an expert role, which may lead to an endless question-and-answer feedback loop, it is crucial that the patient trust the clinician’s level of competence. As pointed out by Tyler et al (2001), it is important to nurture patient expectations and to instill hope, and the patient should get a sense of confidence that this is the right place to talk about tinnitus. However, at the same time, the patient should have realistic expectations, including that treatment is not likely to affect the loudness of tinnitus.
TREATMENT RATIONALE

A rationale, or explanation, of the aims of the treatment is given at the end of the first assessment session, but there is a need to continue to update and specify the rationale for each of the treatment components presented in Table 8–1. As mentioned previously, the therapeutic relationship is important, but so too is the structure of the sessions. The clinician needs to check previous knowledge because some patients may have extensive knowledge about tinnitus and, in some cases, psychology. Previous experience with psychotherapy is important to probe because may interfere with the treatment if unrecognized.

The rationale for the CBT treatment is put forward in an individualized manner, with sensitivity to each patient’s idiosyncrasies. First, feedback on the structured interview is given, then the obtained information is used to present a model, which is done with the patient’s input. This model can be represented as a cycle, with stress and other factors leading to increased awareness of tinnitus, which then causes more stress, and so on. In our presentation we have found it useful to distinguish between the actual tinnitus “sound” and the consequences of tinnitus. We explain how tinnitus can be conditioned to strong emotional reactions; however, we know from research that the interpretation of stimuli affects how they are processed. We explain this using metaphors (e.g., the reaction generated when hearing a sound outside the door at night). We then explain the role of selective attention and the attention-grabbing properties of tinnitus. For example, the ineffectiveness of masking the tinnitus is discussed in terms of selective attention and lack of habituation. Then the distinction between the tinnitus sound and the consequences of tinnitus is made. For example, tinnitus may sound like a loud, annoying horn; and this in turn may be associated with (i.e., lead to) increased tension, inactivity, and hopelessness. These are examples of consequences of tinnitus. Although the cause–effect relationship can be disputed, it is not appropriate at this point to dispute the patient’s belief about the effects of tinnitus. However, it is often the case that there are a host of other factors or problems that are causally related to the problems attributed to tinnitus (e.g., lowered mood because of problems at work). Instead of pointing that out, in our presentation we use a model of tinnitus symbolized as two circles (Fig. 8–1). The “tinnitus today” circle is larger and illustrates the consequences or effects of tinnitus. The second circle, “what we want to achieve,” is smaller and represents the treatment ingredients put forward as possible ways to shrink the tinnitus effects circle. The point is to illustrate that the “core” tinnitus may remain the same, whereas the consequences and the area in life devoted to tinnitus may decrease.

This is a very simple heuristic model, but it has the advantage that it can be constructed together with the patient and that both the worsening and the alleviating factors can be focused simultaneously. For example, in the “tinnitus today” circle, factors influencing tinnitus positively (represented by arrows pointing toward the circle) can be added, such as, “being on vacation.” Instead of focusing on things that are difficult to change, then, the influencing factors can be seen as easier to alter.

Yet another part of the presentation is to point out to the patient that CBT for tinnitus requires some relatively hard work, and that the person will need to work on registrations, exercises, and so on, for the whole treatment period,
which includes daily homework assignments. Some patients at this stage may be reluctant and question whether it is realistic for them to add another activity (i.e., the treatment) to their already busy schedule. It is best to be frank when this question comes up. First, we say that it is unlikely that they would have come here if tinnitus was not a problem that needed to be addressed. Second, we point out that tinnitus at the beginning of treatment may become more noticeable, which indicates we are tapping the right processes that are influencing the distress associated with tinnitus. An example is working with stress problems, including monitoring the stress and testing problem-solving strategies. This at first may be perceived as increasing the stress, but it is very likely to decrease the stress in the long run. The parallel to exercise can be useful here. Effects will be noticeable in the long run. The treatment is not a quick fix. Tinnitus can be viewed as a signal to start doing other things in life, and some good things may come out of it all, although it is always crucial to acknowledge that tinnitus is something real and a hard challenge.

A mountain metaphor can be used to describe how the treatment comes into the patient’s life: At first, treatment is like climbing up a mountain, with all the patient’s problems, seemingly insurmountable, ahead, but perhaps this is the only way to leave the mountain behind. Or perhaps the patient could try an alternative strategy and walk around the mountain. The point, though, is, whether it is scaled or walked around, the mountain is there.

It is important to return to the original treatment rationale as more specific information is given regarding each component. Be sure the patient understands the rationale. For example, already in the structured interview we ask: What did you think when the doctor suggested you should see a psychologist? The patient needs to see that thoughts, emotional state, and behaviors influence how tinnitus is tackled, and if there is a strong disease conviction, psychological treatment is not likely to work.
Applied Relaxation

TREATMENT RATIONALE

The rationale for applied relaxation includes, but is not restricted to, the following information (adapted from Öst, 1987). The text that is set in italics can be used as a training manual or patient handout to introduce the patient to the treatment/training protocol and to guide the patient in practicing at home.

Tinnitus is often associated with increased bodily tension, not the least because of how one reacts to tinnitus. There are also studies suggesting that muscular tension can be associated with increased loudness of tinnitus. Relaxation can make tinnitus more tolerable, decrease tension, and increase general well-being. Moreover, it can be a way to handle some of the consequences of tinnitus (e.g., irritation) and lead to increased control. Applied relaxation is a self-control technique in four steps, with each step building on previous skills obtained. The aim of the technique is to learn the skill of relaxation, which can be applied very rapidly and in practically any situation. This skill can be compared with any other learned skill (e.g., learning to swim, ride a bike, or drive a car), in that it takes time and practice to learn, but once you have mastered it, you can use it anywhere. You should not become restricted to the calm and nonstressful situation in this office or your own home.

The goal is to be able to relax in 20 to 30 seconds and to use this skill to counteract the physiological and mental reactions you may have in relation to tinnitus and other stressors in life. To achieve this goal, we will go through a step-by-step process, starting with tensing and relaxing different muscle groups. This will take about 15 minutes, and you will practice this twice a day. Next, we reduce the time by taking the tensing exercise away, just relaxing, which will take about 5 to 7 minutes, but we will add an exercise involving imagery techniques, which will take about 2 to 3 minutes. The next step teaches you to connect a self-instruction to the bodily and mental state of relaxation. We will then introduce rapid relaxation, which you will practice many times in nonstressful situations. In the last step, you will learn to apply the relaxation skill in more difficult situations related to your tinnitus.

The aim is not to reduce tinnitus per se, but to control its effects. However, you should not be surprised if you come to perceive your tinnitus as decreased. The goal of applied relaxation is to obtain a balanced state of mind. It is the average level of tension during the day that is important to decrease, not only those occasions when you feel especially tense. In fact, individuals who do not feel particularly tense also benefit from applied relaxation. In association with the relaxation training imagery, techniques will be introduced (e.g., imagining a beach) that are useful for coping with tinnitus. Numerous research studies have found that applied relaxation has positive effects on medical conditions (e.g., pain), but it’s also beneficial for healthy individuals who come to feel less stressed and more efficient in their daily life. Moreover, applied relaxation is a skill that most people can acquire with the right instructions and a lot of practice. It is a portable skill that can be used in almost any situation, not only directly linked to tinnitus, but also for problems like falling asleep.

It usually takes a while for the positive effects of relaxation to show, sometimes even weeks. In the beginning you may become more aware of your tinnitus and of tension in your body. This is a sign that we are dealing with something important. Applied relaxation does not make tinnitus worse.
Rarely, relaxation may feel strange and odd, and even cause anxiety. If so, stop and try again later. Do not expect immediate effects. Leave time during the day for practicing relaxation. Do not practice when you are short of time or tired.

Finally, applied relaxation is not something you use to get rid of tinnitus, but rather something you apply to make you stronger to deal with tinnitus. The time you devote to applied relaxation is well spent.

INSTRUCTIONS FOR APPLIED RELAXATION

In the following, the instructions for applied relaxation will be presented. Preferably, the therapist should model some of the tensing-relaxing exercises, as modeling facilitates proper understanding. For example, we always point out that it is not good to tense the muscles too much. For some patients it can be necessary to start by using some background sound (e.g., a radio playing soft music). As we will return to later, it is always crucial not to mask the tinnitus, as this can interfere with our goal to habituate the patient to the tinnitus.

Step 1. Progressive Relaxation The important thing here is to learn to feel the difference between tensed and relaxed muscles. To do this, we tense the muscle for 5 seconds, then relax it for 10 to 15 seconds and notice the difference. You also become aware of the location of different muscles. Many people regard it as easier to relax a muscle if they have tensed it first, as the contraction of the muscle automatically leads to resting. The point, again, is to become more aware of your body, and not to obtain a perfectly relaxed state.

The following guidelines are recommended:

- Practice twice daily, preferably the same time every day (e.g., at 10:00 A.M. and 6:00 P.M.).
- Practice alone and be sure that nobody interrupts you.
- Find a quiet place to do the relaxation exercises.
- Avoid being too stressed or tired when doing the relaxation exercises.
- Wear comfortable clothes.
- Sit comfortably, straight and symmetrical.
- Use a chair with neck support, but do not lean backward during the relaxation exercises.
- Place your feet on the floor without pressing them down (you may need to have something under your feet).
- Your head should not fall forward or backward. Hold it straight in relation to your shoulders.
- Place your hands in your lap. Do not clutch them.

Write down the time you start the exercises, and rate your level of tension on a scale of 0 to 100. Do the same thing once you have finished the exercises.

Start by sitting comfortably and close your eyes. Tense (5 seconds) and relax (10 seconds) in this order:

- Right hand (make a fist)
- Left hand
- Both hands
- Upper arm (press your elbows toward your body)
- Forehead (wrinkle your forehead)
Do these exercises twice a day. I will ask you to register in a daily diary each time you do these relaxation exercises. Each occasion will take about 10 to 15 minutes to complete. It is important that you can practice these exercises undisturbed by the telephone, family members, work, or anything else. If you feel that you do not have enough time, it is better to postpone the exercises than to do them in a hurry. A good idea is to have set times and places where you do the applied relaxation training (e.g., 9:00 A.M. at work in your office). In addition, it is preferable that you space the exercise sessions so that you have at least 1 to 2 hours between them. Keep in mind that it is better to practice regularly than to be perfect each time you practice. In fact, 14 moderate exercises during a week are better than 3 perfect ones.

**Step 2. Short Progressive Relaxation**  
The purpose of this step is to reduce the time it takes to become relaxed and to introduce some imagery techniques. In this step you will learn to relax without first tensing the muscles. This will reduce the time needed for doing the relaxation training (5–7 minutes), and you will become more relaxed, as the tensing exercises can interfere with the relaxation. Again, you will need to practice at least twice daily over the next week. The idea is to focus on the same muscles as in the first step and to relax as much as possible. You will also be asked to focus on your breathing. Again, the positive effect of applied relaxation may not be immediately noticeable, and you need to be persistent in your training. Remember that applied relaxation training is most time consuming during the early stages of the treatment. If you should forget the order of relaxing the muscles or how you should do the exercises exactly, do not stop, but continue the exercises. You could always repeat the order before the next session. If you should experience any adverse effects, remember that these are of a temporary nature. Actually, negative reactions can be better than no reactions at all, as it tells us that the relaxation is tapping the processes involved in your problems. Practice will solve this. Do not practice if you are tired, do not have enough time, or are feeling particularly stressed. Also, make sure that you are undisturbed. If you have a problem relaxing any particular muscle, do not give up. Instead, stay focused for a while. Try to visualize the muscle as soft and loose. Continue with the exercise after you have done this. If you still feel that the muscle is not relaxed, you can tense it briefly or move it a bit and then relax. It is common in the beginning of this step to have some problems relaxing muscles without tensing them first. One way to solve this is to shift between steps 1 and 2 for a period.

Although the recommended time for doing this exercise is 5 to 7 minutes, it is up to you to set the pace. If you do not feel sufficiently relaxed, repeat the exercises when you have the time. You can also choose to go over the rest of the muscles in the body.

**Instructions**  
The order of relaxing the muscles is slightly different from step 1. From now on it is the “top to bottom” principle; that is, you begin by relaxing your forehead, then continue by checking each part of the rest of your body down to your feet. To
increase relaxation, it is important to breathe correctly. To ensure that you are breathing properly, you need to breathe deeply from your abdomen.

Write down the time you start the exercises, and rate your level of tension on a scale from 0 to 100. Do the same thing once you have finished the exercises.

In association with the relaxation training, imagery techniques are introduced (e.g., imagining a beach; see section on cognitive techniques).

First, make sure you breathe deeply from your abdomen. You can check for this by holding one hand on your chest and the other on your abdomen. Then place your hands in your lap, close your eyes, and follow these instructions.

You will relax now. Concentrate and relax all your muscles. Let your body rest. 

Begin by checking that your forehead is relaxed ... your eyebrows ... your eyelids. 

Continue with your temples ... tongue ... lips ... and jaw ... 

Relax your neck and throat ... shoulders ... down the arms and out your hands ... to your fingertips ... 

Let the relaxation spread to your stomach ... your back ... now the lower parts of your body ... your legs ... your feet ... out to your toes. Feel relaxed all over your body.

Continue to relax in your whole body. Monitor your breathing ... only your breathing. 

Take a deep breath, hold it, and release. RELAX. Think “RELAX” each time you breathe, so that the word becomes a cue for deeper and deeper relaxation. Feel how easy it is to breathe and that you have become relaxed. End by taking a deep breath. Go back to breathing normally. Check that you are relaxed. If not, go back and try again.

If you find the word relax unsuitable as an instruction, you can switch to another word or a short sentence, for example, “Calm down.” However, it is a good idea to stick with the word or phrase you start practicing with now.

Step 3. Cue-Controlled Relaxation (Controlled Breathing)  The purpose of cue-controlled relaxation is to link your cue word to a calm, smooth breathing pattern. Controlled breathing is an easy way to become relaxed, and the cue word relax serves as an instruction to you and your body. Given proper practice, the process of relaxing to the cue word will become automatic. The controlled breathing and your cue word will make you able to relax within 2 to 4 minutes, which is faster than that achieved in the earlier exercises. However, when starting these exercises, you may need some more time to become fully relaxed. When you have completed these exercises, I will ask you to use your positive image (see Instructions for Positive Imagery). It is good if you can practice 2 to 5 times daily for the next week.

Common Problems  Most people are not used to breathing from their abdomen, and they have devoted little or no thought to their breathing. Usually we breathe more rapidly and from the chest, so it takes some concentration to adjust your breathing so that you are filling your lungs fully. To do these exercises, make sure your clothes are comfortable. It is a challenge to relax in such a short time. If you find it too hard, go back to step 2; that is, review each of your muscles, and when you feel sufficiently relaxed, you can begin doing step 3 exercises.

Write down the time you start the exercises, and rate your level of tension on a scale from 0 to 100. Do the same thing once you have finished these exercises, and comment on the use of the positive image.

Sit in a comfortable position. You can check your breathing by placing one hand on your chest and the other on your abdomen. You are free to use an alternative cue word instead of relax.
1. Close your eyes. Take a deep breath. Release the air slowly and think “RELAX.” Do not push your breath.

2. Breathe with calm, regular breaths. Do not overdo it. Think “RELAX” each time you breathe out. Breathe in at your own pace. Feel that your body is becoming more and more relaxed. Keep this up for 1 or 2 minutes. (One way to do this exercise is to count when you breathe in: 1-relax, 2-relax, 3-relax, etc.)

3. Take a deep breath, release the air slowly, and think “RELAX,” then go back to breathing normally.

Check your body for signs of tension from the head downward, and feel that you are relaxed properly. If not, go back to step 2.

4. Use a positive image in which you are not disturbed by anything. Visualize the seashore, a garden—anything that gives you a sense of ease and peace. Investigate this image with all your senses: sights, odors, sounds, any sensations. Concentrate on this image for a few minutes.

Step 4. Rapid Relaxation—First Session  This exercise has two purposes: to be able to relax in natural nonstressful situations and to further reduce the time it takes to get relaxed, with the goal of being able to relax in 30 to 60 seconds. The exercise can be described as a mini-break or micro-pause from your ongoing activities and thoughts. Let the first exercises take longer, then gradually reduce the time. You need to do this exercise 10 to 20 times each day for it to have a good effect. The reason you keep your eyes open is to learn to use relaxation in everyday settings when it is not possible to keep your eyes closed. Because you will need to do this exercise often and regularly, it can be helpful to plan in advance the situations and places when you can practice. Preferably, these situations will work as cues for you to do the rapid relaxation. Moreover, when you start practice you need to begin with easy situations in which you do not feel tense or nervous. To achieve this, you can think over how your day usually goes and from that plan the situations in which you can do the rapid relaxation. Examples can be in the car, when talking on the phone, when you look at your watch, when you turn on your computer, before eating and coffee breaks, and so on. Write down a list of all the situations and read it through to facilitate remembering the situations. Another method is to write notes to yourself and place them so that you will be reminded (e.g., on the refrigerator). Yet another way is to use small colored stickers and place them where you want to be reminded to do the rapid relaxation. Follow these instructions:

1. Focus your attention on your breathing. Fixate on one point in space and look at it for the whole exercise.

2. Take a deep breath from your abdomen. Release the air slowly and think “RELAX” (or your own cue word).

3. Relax in all of your muscles, throughout your body, from your forehead down to your toes. Feel the relaxation spread in your body.

4. Continue to breathe from your abdomen at your own pace, without exaggerating your breathing. Scan your body for tension.

5. Continue with what you did before the exercise and stop fixating on the point in space.

If you find this too difficult, try taking another deep breath, but avoid taking too many deep breaths in a row, as this may lead to overbreathing, or hyperventilating, which can result in
some dizziness and shortness of breath. This is not dangerous, but you should avoid it. You also could try relaxing for a longer period. The relaxation training is more effective if you stay in a relaxed state long enough. Once you feel that you have mastered the technique, the time to do the exercises can be shortened. Pay extra attention to scanning your body for tension. Concentrate on any body part that feels tense and try to relax that part.

**Step 5. Rapid Relaxation—Second Session**  The exercise for this week is identical to the rapid relaxation you did last week, but this week you will use rapid relaxation in stressful situations and when you are disturbed by your tinnitus. Examples can be when you concentrate on something, when you are attempting to sleep, in noisy environments, when you are problem solving, when you face obstacles, and when your tinnitus sounds loud. It is advisable to apply the relaxation techniques as soon as you feel any tension, as it is more difficult, even impossible, to relax if you are too stressed. Keep in mind that you use these relaxation techniques to feel well overall, and not to ward off tinnitus. Therefore, it is crucial that you apply rapid relaxation in different situations so that it is not linked in your mind to bad experiences. If that happens, rapid relaxation may be a reminder that you have problems, and this is not want we want to achieve.

**Cognitive Techniques**

There are two main cognitive components in the program. The first deals with attention-diversion techniques, use of “inner picture” imagery, and exercises directly aimed at reinterpreting tinnitus as something less painful (see Hallam, 1989; Henry and Wilson, 2001), then applying those skills in real-life settings. The latter involves exposure techniques inspired by the principles used in the treatment of phobias. These techniques are beginning to be applied with chronic pain patients (Vlaeyen et al, 2001), and our experience is that they are applicable for a proportion of tinnitus patients.

The second major cognitive component concerns cognitive restructuring of thoughts and beliefs associated with tinnitus. The patient is helped to identify the content of his or her thoughts and is taught ways to challenge or control those thoughts that are unhelpful or inaccurate. It is important to note that this is not equal to “positive thinking.” In the context of changing beliefs and thoughts, it is important to work toward acceptance of tinnitus and to foster the idea that tinnitus is not worth all the attention it gets. We present the idea that thoughts and emotions related to tinnitus sometimes are the main source of the problems. During later stages of the treatment it can be valuable to work for reinterpretation of tinnitus into something less threatening. Fear and beliefs that tinnitus will lead to something harmful in the long run are not uncommon and should be dealt with in the treatment. Problems with concentration are often a source of great distress for the tinnitus sufferer and are targeted in the treatment. Although not well developed for tinnitus, methods for improving concentration and memory training can be used. Strong emotional reactions, particularly involving fear and avoidance, are commonly associated with tinnitus. They can lead to a negative view of tinnitus and can occasionally develop into panic-like attacks when the patient seeks to escape from tinnitus. Apart from advice regarding sound enrichment, the program deals with adverse reactions to silence (when this is a problem).
The following is an example of the use of positive imagery. Occasionally, the therapist can skip aspects relating to sounds in the instruction (at least the first time), and ask patients afterward if they were aware of tinnitus during the exercise. Often, patients report that they forgot their tinnitus while focusing on the image.

INSTRUCTIONS FOR POSITIVE IMAGERY

There are many advantages to being able to use positive imagery: (1) it can help you maintain a relaxed state; (2) the positive image can become the mental equivalent of your bodily relaxation; (3) your mental abilities and focusing skills are maintained; (4) it can increase general well-being. The following suggestions are given.

1. Choose a mental image unrelated to your tinnitus. It can be something from nature or wildlife. One example is picturing yourself standing on the beach and looking out at the sea. You can choose something you have seen in real life, but it is better not to include other people in your image. Also, your image should not be associated with any problem solving, work, or other effort. It is good to involve several senses, including vision, hearing, and smell.

2. Use your relaxation exercises from steps 1 through 4, then start focusing on your positive image.

3. Imagine that you are exploring that image. For example, you can look out over the sea, to the right, to the left, perhaps see a boat . . . look at the beach . . . smell the salty air and feel the sand under your feet . . . feel the wind blowing . . . hear the waves . . . notice other details.

4. Let go of your positive image and slowly open your eyes. Do not stay too long with your image so that tinnitus takes over. If that happens, focus again on your positive image. Stop if you lose your concentration. Start by doing small exercises, so as not to overdo it.

Hearing Tactics

Because many tinnitus patients also suffer from hearing loss, advice regarding hearing rehabilitation is given. Hearing tactics were defined by van der Lieth (1973) as “those methods used by someone suffering [with] a hearing impairment to solve the problems of his daily life—the practical, technical, and psychological problems caused by the handicap” (p. 209). Hearing tactics often deal with different ways of facilitating communication, such as optimizing signals and using conversational strategies. A cognitive-behavioral adaptation of hearing tactics has been developed by our research group (Andersson, 2000; Andersson et al, 1995b). In the tinnitus program a condensed version is used based on individual needs. Training in behavioral hearing tactics involves communication skills training, in which the participant is encouraged to focus on one person and concentrate on the communication with him or her. This includes proper positioning in relation to the other person, moderately expressive body language, and being active in the conversation. When hearing fails, repair strategies are practiced, which include ways of handling missing information and asking for confirmation if the participant has understood things correctly. This necessitates active listening and focusing on the meaning instead of the details of the message. Assertive responses are practiced, such as telling others about the hearing loss and
anticipating their reactions. Also covered are waiting for your turn, reinforcing the behavior of the communication partner, and the advantages of talking on a topic about which you have knowledge. In our practice we distribute a leaflet that includes advice on communication with hearing-impaired people, which patients are to present to their closest relatives or friends as a homework assignment. We then discuss the supporting role of relatives and friends and the ways they can help. Homework includes distribution of the leaflet and of individualized applications of the skills taught earlier.

Sleep Management

Sleep hygiene, bedtime and worry-time restriction, relaxation, and cognitive restructuring can be helpful for patients with sleep problems (McKenna, 2000). These methods are tailored according to the special needs of the tinnitus patient.

Relapse Prevention

In brief, this includes a proper discussion of risk factors for developing more severe tinnitus and hearing loss, then devising a plan for what to do should the tinnitus become worse (Henry and Wilson, 2001). This can include returning to the relaxation training and to the sound-enrichment strategies.

As part of the secondary prevention part, the importance of regular exercise is covered. The word exercise is usually associated with hard work, sweat, and muscles. The exercise we often forget is the one we can get naturally, for example, by cycling or walking instead of taking the car or bus for short distances. Taking the stairs instead of the elevator is another example. Instead of a coffee break, a walk in the park could be beneficial. Several research studies show that exercise can alleviate and even prevent depression, insomnia, and stress (Gullette and Blumenthal, 1996), and some preliminary evidence suggests that exercise is good for tinnitus too. The effects of exercise are similar to the effects of relaxation; that is, physical and mental balance, but the approach is different. A combination of the two is likely to have beneficial effects.

During exercise or immediately after, tinnitus can become temporarily louder and more noticeable. However, this is often temporary, and the beneficial effects of exercise always outweigh the small fluctuation in loudness the patient may perceive. On the contrary, most people find that tinnitus disturbs them less when they exercise. The patient is instructed not to be too ambitious and to gradually extend the time he or she devotes to exercise. Almost all activity can be regarded as exercise.

Cautions for the Cognitive-Behavioral Approach

Psychopathology and Tinnitus

Although preexisting psychological characteristics most likely affect the way a person reacts to tinnitus (Stouffer and Tyler, 1992), there is little evidence that psychiatric disturbance directly causes tinnitus. However, signs of moderate depression are common in patients with tinnitus, but this does not usually call for a different treatment approach from that described earlier. When a patient
fulfills the criteria for major depression according to the classification system provided by the *Diagnostic and Statistical Manual of Mental Disorders* (American Psychiatric Association, 1994), a clinician should consider referral to a psychiatrist. Even as CBT-oriented psychologists, we make sure that major depression is handled first because it is a serious condition that often impedes tinnitus rehabilitation if the depression is not handled properly. In addition, clinically depressed tinnitus patients should be informed about the treatment options and the studies showing improvement following the use of antidepressants (Sullivan et al, 1993). Because cognitive-behavioral therapy is also a helpful treatment for depression (Dobson, 1989), it can sometimes be advisable to combine treatments for depression and tinnitus (for a similar discussion involving the field of chronic pain treatment, see Williams, 1998). Studies investigating the effects of such a strategy have not been conducted.

**When Applied Relaxation Should Not Be Used**

The first example of when relaxation should not be used is when a patient is clinically depressed and shows clear signs of psychomotor retardation. It is evident that a patient who can hardly stand up because of fatigue and malaise should not be instructed to relax more. Instead, behavioral activation should be recommended. There are other precautions to consider when a patient is on medication or is suffering from a medical condition when the effects of relaxation should be specifically targeted for that condition. An example is asthma. It is not that relaxation is counterproductive in the case of the asthma patient; rather, it is that it cannot be presented in isolation. As already mentioned, applied relaxation can be used as an avoidant strategy instead of an approaching strategy, and that is why the reasons for doing relaxation always should be discussed and monitored.

**Groups versus Individual Treatment**

Although there are similarities, there are also differences between individual work and group treatment. Clearly, some individualization is sacrificed in group treatment, but on the other hand the group provides an interpersonal context in which patients can learn new ways of dealing with tinnitus, and they can also benefit directly from each other’s experiences. Group treatment is also cost effective, can help cut waiting lists, and can therefore be made available to patients more quickly. Positive experiences from cognitive-behavioral therapy in small group settings have been reported (Henry and Wilson, 2000; Kröner-Herwig et al, 1995) and a majority of published controlled trials on CBT for tinnitus have been in the form of group treatment (Andersson and Lyttkens, 1999). A distinguishing feature about the Uppsala studies (e.g., Scott et al, 1985), in which applied relaxation has been used, is that treatment has been conducted individually. Preliminary outcome data suggest that the results of the protocol can be extended to group treatment, which probably is the most common treatment format in clinical practice for tinnitus patients. Also, there were no clear differences in efficacy between individual and group treatments when the two formats were compared in a meta-analysis (Andersson and Lyttkens, 1999). To our knowledge, there has been no direct comparison between the two formats in the same research study.
Conclusion

The protocol described in this chapter has been evaluated in a series of studies conducted in Uppsala (for a review, see Andersson et al, 1995a). The effects of psychological treatment have been reviewed, most recently in a meta-analysis (Andersson and Lyttkens, 1999). Overall, the effects are well established, and although the strongest effects have been found immediately following treatment, there is evidence that positive treatment effects are maintained at follow-up. However, the effects are mostly seen with regard to tinnitus annoyance and to a lesser extent the perceived loudness of tinnitus. In a majority of studies on the effects of cognitive-behavioral therapy for tinnitus, psychologists have served as therapists, and it is now appropriate that the methods are adapted for use by a broader range of professionals such as hearing therapists and audiologists.

Applied relaxation, used in conjunction with other CBT techniques, represents a useful treatment for tinnitus. The method is easy to learn and has beneficial effects overall, not just on tinnitus distress.

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Tinnitus Activities Treatment

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Activities treatment is an extension of our earlier work on information counseling, providing information to the patient about tinnitus and associated problems, considering the patient’s overall well-being, and suggesting appropriate coping strategies (Tyler and Babin, 1986; Tyler and Baker, 1983). In most situations we combine activities treatment with partial masking sound therapy (e.g., Stouffer and Tyler, 1990; Tyler et al, 1989). We strongly believe it is important to consider “all the patient’s difficulties, not only an isolated problem” (Tyler and Babin, 1986, p. 3215). For example, we and others have realized the importance of reassuring patients that tinnitus was not an indication of a life-threatening disease, and educating them about the high prevalence of tinnitus in the general population (Stouffer et al, 1991). We recommend the use of a tinnitus problems questionnaire (Tyler and Baker, 1983) as part of a counseling program to determine the issues that are especially important to the patient (see also Chapter 1 in this book). This “represents an excellent opportunity for the patient to consider the problems that he or she attributes to tinnitus” (Tyler and Baker, 1983, p. 153).

Early work that has influenced our counseling includes landmark studies by Richard Hallam and colleagues (e.g., Hallam, 1989; Hallam et al, 1984; Hallam et al, 1988). Other important and influential work is that of Sweetow (1984), Coles (1987), and Coles and Hallam (1987). The significant contributions of Peter Wilson and colleagues (Henry and Wilson, 2001, 2002; Wilson et al, 1998) have been immensely helpful in organizing our overall plan and providing excellent examples of treatment goals and patient interactions. The summary of clinical techniques recommended for audiologists by Flasher and Fogle (2004) also has been helpful.
Tinnitus Partial Masking Therapy

Although not a focus of this chapter, we often include sound therapy, particularly tinnitus partial masking therapy, with this counseling package. Since the early 1980s, we have been using noise to partly mask tinnitus so that both the tinnitus and the noise are heard (see Bentler and Tyler, 1987; Tyler and Babin, 1986, Tyler and Bentler, 1987). Our general sound therapy strategy remains the same, in that we “urge the patient to use the lowest level masker that provides adequate relief” (Tyler and Babin, 1986, p. 3213). Sound therapy is not used with all patients, and when it is used, we do not insist that the noise be present all the time. Hearing-impaired people often experience difficulty hearing in noise (e.g., Tyler et al, 1983), and there may be some situations where they prefer hearing better over the partial relief of tinnitus provided by noise. We also caution that frequent changing of the noise levels may call attention to the tinnitus. Selecting a single, low-level noise is preferable. Recently, we have been using soft background music in place of background noise with some patients (see also Chapter 11).

Patient Expectation Nurturing

We have discussed in some detail the importance of providing a positive outlook for the patient (Tyler et al, 2001). The areas that are relevant to tinnitus treatment in nurturing patient expectations include:

- Being perceived as a knowledgeable professional
- Being sympathetic
- Demonstrating an understanding of the problem
- Having a clear therapy plan
- Sincerely caring about the patient
- Providing feelings of mastery
- Providing hope for the patient

Picture-Based Counseling

In 2001, Tyler and Bergan introduced the concept of picture-based counseling for tinnitus patients. For each counseling session and topic, we produced a series of illustrations that we show to the patient. We believe this approach is helpful because

- The session proceeds in an orderly fashion.
- The clinician does not overlook important concepts.
- It is easier for the patient to understand concepts.
- The treatment can be easily used by other clinicians.
- In studies comparing tinnitus treatments, it is easier to control counseling across conditions and therapists.

Discussions can be adapted to the needs and sophistication of each patient.

Activities Treatment

Our experience in treating tinnitus patients and our discussions with other experts led us to group the problems faced by tinnitus patients into four broad categories:

- Emotional well-being
- Hearing
Sleep
Concentration

Impairments in these areas can lead to additional social and work problems. We believe that a complete treatment plan should address all of these categories. Any area not of concern for the patient can be omitted from counseling. The counseling provided in each of these areas is described in more detail later in this chapter.

Components of Tinnitus Activities Treatment

There are three main components of tinnitus activities treatment, which are integrated with each other. These components are informational counseling, activities engagement, and sound therapy (when needed).

Determining Which of the Four Activities to Treat

Because not all patients will require treatment in all four activities categories, we initially determine which areas require treatment. To assist in this, we administer the Tinnitus Activities Questionnaire (Fig. 9–1). This questionnaire produces a score in each of the four areas (emotional well-being, hearing, sleep, and concentration) and, in conjunction with input from the patient, an overall treatment plan can be devised.

When designing questionnaires, we prefer a scale from 0 to 100. This provides better resolution than scales with only 7 or 10 points. In the latter case, patients often do not use values close to the end points, so the 7-point scale often becomes a 5- or 3-point scale, and the 10-point scale becomes an 8- or 6-point scale. With 100-point scales, patients typically use either 10- or 5-point intervals. When the questionnaire is administered several times, standard deviations can be obtained for each question, and statistically significant changes for each individual question can be studied. The use of the 100-point scale has been criticized because it may be unwieldy or too esoteric for some patients (Newman and Sandridge, 2004). In our experience this is not the case. With a 100-point scale, we suggest that the patient consider the scale like a dollar bill, and to consider their responses like pennies or nickels or dimes. We have administered this and similar 100-point questionnaires to thousands of patients and have never seen one who found it too unwieldy or esoteric.

Activities Treatment Protocol

Emotional Well-Being

Tinnitus patients, like most people, often are experiencing problems in many aspects of their lives. Therefore, we begin our counseling by learning from the patients what general concerns are important for them. Occasionally, it becomes evident that the problems are beyond our expertise, and appropriate referrals to a clinical psychologist or psychiatrist are made.

We approach this by:

- Listening to the patient
- Providing information about hearing, hearing loss, tinnitus, and attention
- Discussing ways to make tinnitus less important
- Changing lifestyle to manage better
LISTENING TO THE PATIENT

It is critical to determine what is important for the individual patient. Why is the patient here? What does he or she expect? Is the patient alone, or does he or she have support? Are other important things going on in the patient’s life in addition to tinnitus? Probing questions can help obtain such information. The answers to these questions can influence the direction of counseling. Having the patient describe how tinnitus has affected his or her life can be a useful way to begin. This facilitates a basic understanding of the whole patient and assists the clinician in determining when referrals to other professionals (i.e., psychologists, physicians) may be warranted. Fig. 9–2 is one of the illustrations we use to encourage...
patients to tell us about their specific problems. We say, “Please make a list of the difficulties that you think have been caused by your tinnitus. List them in order of importance.”

PROVIDING INFORMATION ABOUT HEARING, HEARING LOSS, TINNITUS, AND ATTENTION

Providing basic information on tinnitus and related issues

- Helps patients realize they are not alone
- Removes some of the fear of the unknown
- Assists them in developing realistic expectations

In general, providing knowledge about hearing loss and tinnitus removes many unknowns, misconceptions, and fears. Fig. 9–3 conveys the concept of the coding of information in the nerves and in the brain. This neural activity is used to code the presence of acoustic sound. However, even without sound, there is random spontaneous activity in the nerves and in the brain. Later in the therapy session we discuss how tinnitus is likely coded in spontaneous activity (see Fig. 9–4).

A few common issues are addressed directly, including those posed by the following questions:

- Am I going to become deaf?
- Do I have a tumor?
- Will my tinnitus get worse?

We also follow the work of Hallam (1989), who emphasized the importance of hearing and attention. For example, he noted that we normally attend to only one thing at a time (see Fig. 9–5). Our attention can be diverted by things that are unusual or surprising. Hallam gave the example of a refrigerator hum being repetitive and meaningless so that our brain automatically tunes it out. Another example provided by Hallam is that we cannot decide not to pay attention to items—we subconsciously monitor the sensory environment for significant
events (see Fig. 9–6). This is normal. If we decide tinnitus is important to monitor, then we will not be able to habituate to tinnitus. Hallam suggested that most people can learn to ignore tinnitus in ~18 months.

**DISCUSSING WAYS TO MAKE TINNITUS LESS IMPORTANT**

Our tinnitus treatment is designed to help patients change how they think about and react to their tinnitus. Providing information can help patients realize that their tinnitus need not be threatening. We have patients consider how they view their tinnitus. We also encourage patients to refocus their attention on other activities, such as joining new clubs and learning new tasks. It is important

**Figure 9–3** Diagram showing how neural impulses convey information to the brain. In the absence of any acoustic sound, there is random spontaneous activity on nerve fibers. When a word is spoken, such as *table*, a particular pattern of impulses is conveyed. Other sounds, such as the sound of a cricket, create a unique pattern of activity.

**Figure 9–4** Examples of neural presentations of tinnitus that are perceived as the sounds of a whistle and a cricket. Patients are asked to describe what their tinnitus sounds like.
for patients to know that many people have tinnitus and are able to lead happy and productive lives. Group counseling (see Chapter 14) can be very effective with tinnitus patients.

EFFECTIVE LIFESTYLE CHANGES FOR BETTER TINNITUS MANAGEMENT

Addressing the many ways tinnitus can affect a patient (including sleep, hearing, and concentration) can lead to improvement in these areas and also help with the individual’s general emotional well-being. Part of this arises from the way the patient thinks about these issues. Cognitive therapy separates the tinnitus from the patient’s reaction to it (see Fig. 9–7).

Patients often benefit from being given a specific assignment to work on to assist them in changing how they cope with their tinnitus. We sometimes use a “tinnitus

Figure 9–6 Illustration depicting how an important subconscious stimulus can grab our attention. Although Fred and Jane are talking between themselves, Fred’s conscious attention is interrupted when his name is mentioned in a background conversation.
diary” for the first few weeks of treatment. Patients are asked to list situations where their tinnitus is worse and situations where their tinnitus is better (Stouffer and Tyler, 1990). It is then possible to discuss these situations and determine if the patient’s environment can be modified to increase the good situations and decrease the bad ones. We recommend that such a diary be used for only a few weeks because we want the patient to move away from thinking about tinnitus.

The use of background sound and partial masking is helpful to many patients. Even if we do not recommend a wearable device for partial or total masking, providing a rationale for and activities related to background sound is usually helpful. Fig. 9–8 shows how partial masking can reduce the neural prominence of the tinnitus. Fig. 9–9 shows how we draw analogies between the visual and auditory domain; partial masking can be effective in either. Fig. 9–10 is one of several examples of activities the patient can use to decrease the prominence of the tinnitus. Having this knowledge and skill is helpful for all four areas: emotional well-being, sleep, hearing, and concentration.

Sleep

Sleep disturbances are very common in tinnitus patients (e.g., McKenna, 2000; Tyler and Baker, 1983; see also Chapter 7). Some patients report difficulty falling asleep, waking during the night, early awakening, or being tired during the day. Being under emotional stress and having difficulty concentrating and hearing can also contribute to fatigue. Our therapy regarding sleep includes:

- Understanding normal sleep patterns
- Exploring factors that can affect sleep (stress, environmental noise, room temperature)
Arranging the bedroom to promote sleep (i.e., comfortable bedding, removing non-sleep-related items from the bedroom)

Avoiding drinking alcohol, smoking, and eating before bedtime

Using background sound to reduce the prominence of tinnitus (i.e., quiet music, nature sounds)

Learning relaxation exercises (i.e., progressive muscle relaxation and visual imagery)

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Figure 9–9  Illustration depicting the analogy between partial masking of light and sound. On the left, a candle in a dark room is partially masked by the bright sunlight through a window. On the right, the tinnitus is partially masked by a background noise.
Fig. 9–11 lists steps to be taken to arrange a bedroom and encourage good sleep patterns.

Hearing

The goal of this therapy is to help patients understand how tinnitus can affect hearing and provide some approaches for patients to use to improve their hearing. Improving hearing should

- Alleviate some of the communication difficulties associated with hearing loss
- Improve communication difficulties associated with tinnitus
- Reduce stress

Fig. 9–12 introduces some of the general areas to be covered regarding hearing. Many of these areas can actually be demonstrated, not simply discussed.

HEARING AND HEARING LOSS

One way to reduce difficulties associated with hearing loss is to help the patient better understand hearing and hearing loss. First, we briefly explain to our patients how the auditory system works by reviewing some basic anatomy and physiology. Second, we talk to them about how the auditory system is affected when we acquire a hearing loss. Finally, we discuss with our patients various difficulties that they may experience as a result of their hearing impairment. Particularly, we help them understand the perceptual consequences of hearing loss and that some sounds that they once heard may be difficult to distinguish or may no longer be audible to them at all. For example, if they have a high-frequency hearing loss, we would explain to them why they perceive people talking
to them as “mumbling” or why sounds with mostly high-frequency energy, like /s/, will often no longer be heard. We also explain to them how noise can affect their hearing and the importance of the signal-to-noise ratio.

HEARING DIFFICULTIES DUE TO HEARING LOSS AND TINNITUS

It is important to help patients understand and distinguish difficulties they may be experiencing due to their hearing loss versus those they may be experiencing as a result of their tinnitus. We explain to patients that hearing loss will make some sounds they hear seem distorted and other sounds almost completely inaudible. We also explain that tinnitus does not cause a hearing loss, but it can produce hearing difficulty by distracting one from listening. The ringing, buzzing, or roaring sound of the tinnitus can also produce a masking of some sounds (Surr et al, 1985). In addition, we explain that tinnitus can cause difficulties in distinguishing one sound from another because the tinnitus sound can be confused with other sounds that have the same pitch. For example, sometimes people with tinnitus may hear a sound, like a whistle, then discover that it was actually their tinnitus.

Figure 9–11  Activities for arranging the bedroom to facilitate sleep.

Figure 9–12  Different factors that can affect communication.

- Eliminate: Television set, computer, food/drink, etc.
- Add: Comfortable mattress, pillows, blankets, etc
- Darken the bedroom.
- Set temperature to 58° to 68° F.
STRATEGIES TO IMPROVE HEARING AND REDUCE STRESS

There are three main areas that we discuss in detail to help patients better manage their hearing loss. These consist of the following.

Amplification The first step in managing a hearing loss is to make sure that patients are fit with an appropriate hearing device (see Chapters 12 and 13). This may consist of fitting the patient with a hearing aid or an assistive listening device. First, we explain to the patient how a hearing aid and an assistive listening device function. Next, we discuss the importance of using a device that is appropriate for the patient’s hearing loss and personal life. We also discuss the advantages of binaural hearing aids (Balfour and Hawkins, 1992). Finally, if the patient is already wearing a hearing device, we check the appropriateness of the fit and briefly answer any questions that the patient may have about the current device.

Environment Patients are often unaware of how the environment influences their hearing performance. We teach patients that environments with the following characteristics are more suitable for facilitating a conversation (Dillon, 2001):

- Good lighting
  - Making sure that there is adequate light to illuminate the communication partner’s face without shadowing it
  - Moving away from light that is shining directly in the listener’s eyes and making it difficult to see the communication partner’s face
- Positioning
  - Being close to the communication partner, thereby creating a better signal-to-noise ratio
  - Making sure that the face of the communication partner is visible and not in profile
- Minimizing visual distractions
  - Closing a door to eliminate movement from another room
  - Closing a window to eliminate blowing curtains or other distractions
  - Turning off a television
- Minimizing noise
  - Turning off extraneous sources of noise (TV, radio, kitchen appliances, etc.)
  - Closing doors and windows to minimize background noise

Communication One of the most important things we do with our patients is to empower them to take charge of their hearing loss by using an effective communication style. First, we define assertive communication and compare that with passive and aggressive styles (Tye-Murray, 1998). We then teach them, regardless of their personality type, how to become an assertive rather than a passive or aggressive communicator. Finally, we demonstrate appropriate assertive communication while teaching the following:

- Use of repair strategies to repair communication breakdowns (i.e., asking individuals to slow down, use clear speech, repeat, rephrase, reduce, or elaborate sentences).
• Use of anticipatory strategies prior to communication interactions (i.e., knowing the topic and/or key vocabulary words, using relaxation techniques, and/or practicing dialogue)
• How to disclose hearing loss to potential conversation partners, when appropriate
• Speech-reading strategies (i.e., watching facial expressions and body movements)

**Concentration**

We address three areas to improve concentration: providing information, decreasing the prominence of the tinnitus, and increasing attention to the task at hand.

**Provide Information about Concentration Difficulties**

Everyone can be distracted by visual and auditory stimuli. **Fig. 9–13** reviews factors that contribute to our ability to concentrate and sets the stage for related activities. Distracting stimuli can be

- Annoying
- Fearful

**Figure 9–13** Things that can affect concentration, including factors in (A) the environment and (B) your physical and emotional state.
• Competing with the desired target
• Loud
• Unpredictable
• Uncontrollable

We begin by discussing differences in concentration skills. Some people cannot read in a noisy coffee shop, whereas others can do so easily. Yet people can learn to focus their attention. An example of this is that some individuals with chronic pain can successfully train themselves to focus their attention away from their discomfort and onto other activities.

Not everyone is distracted by his or her tinnitus. We discuss reasons for these individual differences. We also ask patients if there are situations where they are not distracted by their tinnitus. We try to figure out what it is about these situations, and whether or not their characteristics can be transposed to other situations.

We discuss the fears patients may have about tinnitus and, with appropriate information, help them to realize that they do not need to be so threatened by the disorder.

DECREASING THE INTRUSIVENESS OF THE DISTRACTION

Various kinds of sound therapy can decrease the prominence of tinnitus and reduce its distracting nature. We often recommend partial masking, with either wearable or nonwearable devices, and have recently used background music in a more systematic fashion (see Figs. 9–9 and 9–10).

We compare the intrusiveness of intense visual stimuli in a dark room to the intrusiveness of tinnitus in a quiet room. Adding more background light can be helpful in the first situation, in the same way that adding low levels of background sound can be helpful in dealing with the tinnitus. The effects of light and real (non-tinnitus) sounds can be demonstrated in activities during the counseling session. For example, many patients prefer the masking sound of water when they are required to listen to an intense whistle.

FOCUSBING ATTENTION ON THE TASK

Henry and Wilson (2001, p. 79) describe an “attention diversion” approach to help tinnitus patients. Patients practice refocusing their attention from one stimulus to another (Fig. 9–14). In this therapy, we have found that it can be easier to begin with physical sensations, such as clothing on the skin. Practice can then be done with being aware of external sounds and, later, directing attention to and from tinnitus. Patients are taught that there are some aspects of their attention they can control, and that they can divert attention away from their tinnitus and onto other tasks.

Another strategy is for patients to modify how they approach tasks in which they are having difficulty concentrating (Fig. 9–15). For example, a complex task requiring focused and prolonged concentration can be reduced to smaller tasks requiring less intense concentration, or tasks that require intense concentration can be done for shorter periods of time. Reading is one task that can easily be segmented into shorter intervals.

Developing self-confidence can help a patient concentrate. Learning a new task can increase motivation. Patients can be encouraged to learn a new game or try a
new computer program, for example. When patients are able to experience success with their concentration abilities, they may feel greater control over their concentration skills and be more confident when undertaking future tasks.

Duration of Therapy Sessions

For many patients, it may be that a 5- to 15-minute counseling session that provides a brief overview of the general principles outlined in this chapter will be sufficient (see Preece et al, 2003; Tyler and Erlandsson, 2000). During the initial consultation with a patient we determine if a more thorough counseling session is warranted.

Our complete counseling package is usually provided over the course of several sessions. We have found that presenting the material in this manner gives patients the opportunity to practice the strategies covered in each session for a period of time before returning to discuss their experiences with the clinician. Presenting the material over several sessions also allows for repetition of key concepts and

- Actively participate
- Take notes
- Ask questions
- Repeat information
- Organize and categorize important points

Figure 9–14 Illustration introducing attention control exercises.

Figure 9–15 Examples of how people stay focused when their concentration is challenged.
makes it easier to avoid overloading patients with too much information in any one session. Most patients can complete the counseling in three or four sessions, typically lasting 1 hour each and separated by 1 or 2 weeks.

Conclusion

This chapter outlines our general approach to tinnitus activities therapy and partial masking therapy. The activities therapy covers emotional-well being, hearing, sleep, and concentration. The treatment has evolved from our informational counseling approach of the 1980s and has greatly benefited from the work of Hallam (1989) and Henry and Wilson (2001). We are now testing the treatment in controlled studies to determine its effectiveness.

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Tinnitus Retraining Therapy

GRAZYNA M. BARTNIK AND HENRYK SKARZYŃSKI

Tinnitus retraining therapy (TRT) acknowledges that various centers of the brain, particularly the limbic system and the autonomic nervous system, are involved in tinnitus emergence (Jastreboff, 1990). The involvement of these systems is responsible for the annoyance evoked by tinnitus, and the auditory pathways play a secondary role in these processes. TRT is a specific form of sound therapy and counseling (Jastreboff, 2000) that focuses on suppressing negative reactions and associations caused by tinnitus, as well as on suppressing or even eliminating its perception. The directive counseling session and a series of individual follow-up visits facilitate habituation of reaction of tinnitus. Habituation of perception is achieved by means of sound therapy, preferably by wideband noise generators. The application of sound and counseling is dictated by the category of the treatment, basically determined by the patient’s auditory function and responsiveness to sounds.

TRT is not a cure; instead, it allows some tinnitus patients to achieve a condition in which they are not aware of their tinnitus (Jastreboff and Hazell, 1998). In most cases, even though tinnitus is still perceived, it does not induce annoyance and no longer has a negative impact on the patient’s life (Bartnik et al, 1999, 2001a; Jastreboff, 2000). For cases where tinnitus coexists with hyperacusis, TRT is aimed at desensitizing the patient to sound, which results in improving loudness tolerance by decreasing abnormally increased gain within the auditory pathways (Hazell, 1995).

TRT is recommended to almost all patients with tinnitus who do not require surgery because of some organic pathology. Patients qualified for TRT have come from various backgrounds, are of different ages, and are from all walks of life (Skarzyński et al, 2000). In each case they are given a thorough audiological evaluation, and in justified cases also a medical examination. The purpose of the diagnosis is to rule out any other medical problems that might contribute to tinnitus and retard habituation. More than 90% of patients in our clinic who qualified for TRT had sensorineural tinnitus. However, we also apply TRT after removing acoustic neuromas and all types of middle ear surgery, including otosclerosis or tympanosclerosis operations, when tinnitus is still a problem.
Clinical Protocol for Tinnitus Retraining Therapy

We strictly apply all the procedures regarding an established protocol (Jastreboff and Hazell, 1993). The protocol comprises the following:

1. Case history (filling in the initial contact questionnaire)
2. Audiological evaluation
3. Medical evaluation in justified cases
4. Selection of the treatment category
5. Directive counseling
6. Choosing and fitting the most suitable noise generators and hearing aids
7. Follow-up counseling according to the individual needs of the patient and established schedule

Case History

The interview is based on a questionnaire that determines a certain order of the collected data: personal information, work history, the onset of tinnitus and/or hyperacusis and the duration, the location of tinnitus, the assumed (possible) cause of tinnitus and/or hyperacusis, the coexistence of dizziness or vertigo and headache, other illnesses or ailments, medications, the history of ear problems (possible ear infections, surgery, etc.), the exposure to harmful factors such as loud noise, ototoxic drugs, mechanical and chemical injuries, family history, social habits, and usage of stimulants such as coffee, strong tea, and cigarettes (how often and how much).

The information received from the interview is necessary to be able to carry out the directive counseling. All those facts from the case history are useful in explaining to the patient the possible causes of the tinnitus. Sometimes the coexistence of other illnesses or medications may have an influence on the habituation process, which is discussed with the patient.

Audiological Evaluation

The audiological evaluation is an important part of our protocol. It allows us to assess the psychoacoustical parameters of tinnitus and detect the presence of any other disorders in the auditory system. This also allows us to tell patients that their tinnitus does not indicate any serious medical problem in the auditory pathways. In the directive counseling session we always thoroughly discuss the results of all the audiological tests to inform patients of the condition of their auditory system. On the basis of these tests, we can tell patients in greater detail how their middle ear works and the state of their inner ear and auditory nerve. An audiological evaluation consists of the following:

- Pure-tone audiogram for frequencies up to 12 kHz
- Acoustic immittance and acoustic reflexes
- Otoacoustic emission distortion product (to assess and inform the patient about the condition of the outer hair cells in the inner ears)
- Loudness discomfort level for pure tones for 1, 2, 4, and 8 kHz and tinnitus frequency (to assess the level of sound tolerance)
Special psychoacoustical tests of the characteristics of tinnitus: tinnitus pitch, tinnitus loudness measured for frequency of tinnitus pitch (to assess and explain to patients the psychoacoustical parameters of their tinnitus)

Threshold of broadband noise and minimal masking level for broadband noise (to be able to discuss with patients the level of broadband noise that is required to mask tinnitus at the beginning of treatment and how it changes during TRT)

Test of live speech recognition (to assess the condition of the auditory pathways regarding communication)

Test of auditory brainstem responses (ABRs) for retrocochlear lesion (to determine that there is no pathology at the level of the auditory nerve, especially no acoustic neuroma)

We repeat some of these audiological tests during follow-up visits. Some tests, including the loudness discomfort level and minimal masking level, change during TRT, which shows the progress of therapy.

Medical Evaluation

Some patients qualified for TRT require a medical evaluation to determine if there are any problems related to tinnitus that can influence TRT. If we find such problems (e.g., psychological disturbance, depression, hormonal disorders, illness of circulatory system), the patient needs to be treated simultaneously by specialists in these fields.

Selection of the Treatment Category

On the basis of the interview and some of the audiological tests, the tinnitus patient is assessed using one of five treatment categories (Jastreboff, 2000). The factors determining the appropriate category are the impact of tinnitus on the patient’s life, the presence or absence of hyperacusis, subjective hearing loss, and the presence of prolonged worsening of tinnitus and/or hyperacusis after exposure to moderate or loud sound. “Prolonged effect” means enhancement of tinnitus and/or hyperacusis as a result of noise exposure for several hours or days. The subjective perception of hearing loss takes place when patient subjectively reports problems with hearing in communication.

The separate categories are characterized by the following parameters:

Category 0

- Hyperacusis: absent
- Noise exposure: no prolonged effect
- Subjective hearing loss: absent

In category 0, tinnitus is a limited problem and has little impact on the patient’s life. The directive counseling session and the recommendation to “avoid silence” by using enriched environmental sounds at a level somewhat lower than the tinnitus are often sufficient. This means that every day, the patient must be able to spend substantial amounts of time with environmental sounds just below the level of their mixing point.
Category I

- Hyperacusis: absent
- Noise exposure: no prolonged effect
- Subjective hearing loss: absent

In category I, the patient considers tinnitus a serious problem that affects his or her life. Treatment consists of a directive counseling session, follow-up visits, and a noise generator set at a level close to the mixing point.

Category II

- Hyperacusis: absent
- Noise exposure: no prolonged effect
- Subjective hearing loss: significant

In category II, subjective hearing loss is usually considered the biggest problem, even if the patient shows only a small hearing loss on the audiogram. After directive counseling, we recommend a hearing aid or hearing aid with noise generator in one unit. The aid is needed to improve communication and provide sound therapy. The patient must be able to spend substantial amounts of time during the day using the hearing aid, with the level of environmental sounds set just below the mixing point.

Category III

- Hyperacusis: present
- Noise exposure: no prolonged effect
- Subjective hearing loss: irrelevant or significant

Category III is characterized by significant hyperacusis with or without tinnitus. A noise generator is necessary to help desensitize the hyperacusis. After directive counseling, the patient is told to set the noise generator close to the hearing threshold, and during treatment the level is gradually increased to that of the mixing point. Hyperacusis is always treated first, then tinnitus.

Category IV

- Hyperacusis: present
- Noise exposure: prolonged effect
- Subjective hearing loss: irrelevant or significant

Category IV is tinnitus and/or hyperacusis and prolonged effect of symptoms as a result of sound exposure. This is definitely the most difficult category to treat. In category IV, after directive counseling, the noise generator is set at the hearing threshold, and the level of noise is very gradually increased to the mixing point; however, it is often impossible to use the sound much above the hearing threshold.

The categories of treatment offer general guidelines for directive counseling and the most appropriate approach to sound therapy. These divisions are not strict, and it may be difficult for the clinician to determine whether the patient’s hyperacusis or hearing loss is most problematic and should be the focus of treatment.
The most appropriate category can be chosen once a determination has been made regarding the main ailment of the patient.

**Directive Counseling**

We start with directive counseling (Jastreboff and Hazell, 1998). The counseling session lasts ~1 hour and is aimed at providing a patient with accurate information about tinnitus: the cause in his or her particular case, where abnormal neuronal activity perceived as tinnitus is generated, and the type of mechanism responsible for tinnitus annoyance. The main purpose is to demystify tinnitus, reassure the patient, and decrease negative associations of tinnitus. Some patients have strong negative beliefs about tinnitus (e.g., tinnitus may intensify to an intolerable level; it may cause hearing loss or even deafness). These fears release negative emotional associations and distress that make habituation impossible. To reassure the patient, we use simple descriptions of the neurophysiological model of tinnitus origin. We modify our way of giving information to the patient to his or her understanding capacities. The first step of directive counseling is explaining the anatomy and physiology of the auditory system. We teach the patient the basic function of the auditory system and the brain in reference to the perception of tinnitus.

**ANATOMY AND PHYSIOLOGY**

At the beginning of the counseling session discuss the basic structure of the ear. In order for the patient to understand it better, we use some diagrams of the ear and the hearing pathways. We describe the function of the auditory system, explaining sound changing into electrical impulses. We indicate that inner hair cells (IHCs) are responsible for initiating impulses, whereas outer hair cells (OHCs) are responsible for fine-tuning sounds by enhancing weak signals and attenuating loud signals. We tell the patient that the OHC system is controlled by the brain, and that OHCs are vulnerable to damage by viral infections, noise, stress, ototoxic drugs, mechanical trauma, and other disorders. In addition, we lose ~0.5% of OHCs per year as a result of aging. We show the patient photos of normal and damaged outer and inner hair cells, indicating that usually the OHCs are damaged first, whereas the IHCs are more resistant to injury.

We tell the patient about the phenomenon of frequency specificity that takes place in hair cells on the basilar membrane and in auditory nervous pathways as well. We say that, depending on the place of a lesion, the damage of OHCs will change the mechanical properties of the Corti organ, and consequently abnormal patterns of neuronal impulses can be generated from that place (Jastreboff, 1990).

**GENERATION OF ABNORMAL NEURAL ACTIVITY PERCEIVED AS TINNITUS**

We inform the patient that there is a high level of random spontaneous activity in the auditory nervous pathways. This activity is normally interpreted as a “silence” and is filtered out at the subcortical levels without being perceived in the cerebral cortex. Consequently, we cannot hear this activity as a sound.
Next, we explain to the patient how the brain handles the information conveyed in neuronal impulses. We say that each change of the spontaneous activity caused by a pathology in any place of the hearing pathways can be detected from the background by subcortical centers. The neural system has particularly sensitive mechanisms of detecting new signals that have never been experienced. There are a few subcortical levels of the brain that detect the signals at the subconscious level. They are responsible for filtering, enhancing, and prioritizing the signals before they are sent to the cortex and we become aware of them.

We mention some possible places of tinnitus generation in the auditory system, and we repeat that in the majority of cases, tinnitus is clearly related to some changes in the inner ear. At the same time tinnitus is not necessarily associated with hearing loss. We share the information with the patient that \(\sim 30\%\) of those who suffer from tinnitus do not have any hearing difficulty, and also that many people with hearing loss or even with total deafness do not have tinnitus.

We suggest to the patient that it is discordant damage of the OHC and IHC system that results in the generation of abnormal neuronal activity (Jastreboff, 1990). This can be responsible for initiating a series of processes that lead to the perception of tinnitus. This hypothesis is very useful to help understand the mechanism by which tinnitus is triggered in cases with normal hearing and with hearing loss as well. We repeat that this abnormal neural activity is not tinnitus yet. It is usually a weak signal that is amplified on its way from the ear to the auditory cortex.

**RESULTS OF THE PATIENT’S AUDIOLOGICAL TESTS**

It is essential to familiarize patients with the results of the audiological tests to explain what is happening in their hearing system. We discuss the results to explain to them where a possible pathology responsible for generation of changed neuronal activity (perceived as tinnitus) occurs. The results of the audiological tests let us tell patients the condition of different parts of their auditory system, and they let us eliminate some of the negative beliefs (e.g., tinnitus is connected with a serious pathology in the ear or auditory pathways). We discuss the meaning of hearing threshold, impedance audiometry, and speech recognition, as well as minimal masking level and loudness discomfort level, which are especially important in monitoring the process of habituation.

The tests of characterization of tinnitus, such as loudness, pitch, and minimal masking level, are also discussed. We emphasize to the patient that tinnitus is usually a weak signal. The level of a pure tone equal in loudness to tinnitus is most often \(<10\,\text{dB}\) sensation level, even if the patient complains of very loud tinnitus. It is not uncommon for our patients to perform a loudness balance at or near their threshold. In such patients it is easy to confirm that tinnitus is a phantom perception of neuronal activity, and it can never be compared with a real, external sound.

We explain that peripheral hearing loss exerts a strong influence on the perceived pitch of tinnitus because most often tinnitus pitch is located in the range of frequencies in the slope of the audiogram (Hazell, 1995; Meikle, 1995). Next, we evaluate distortion products otoacoustic emission (DPOAE). It indicates functional integrity of outer hair cells, and for almost all of our patients it shows
cochlear dysfunction in a frequency region corresponding to their perceived tinnitus, even in patients with normal hearing (Bartnik et al, 2002; Hall, 1999; Shiomi et al, 1997). This information is invaluable in counseling patients about the origin of their tinnitus. The observation of a decrease in DPOAE amplitude in some frequency regions in patients with normal hearing fits exactly in the hypothesis of discordant damage of OHCs and IHCs (Jastreboff, 1990). The information gained from DPOAE can also be useful in convincing patients that their problem is real (Hall, 1999).

Finally, we explain to patients the result of the ABR latency test. This allows us to tell them that there are no retrocochlear lesions in their auditory pathways. Many patients are afraid of tumors, so this information makes them feel much calmer.

HOW DOES THE DETECTION OF ABNORMAL NEURONAL ACTIVITY RELATE TO TINNITUS?

After the first part of our consultation, we tell the patient that each incorrect pattern of neuronal activity is easy to notice from the background of spontaneous activity. Consequently, this signal may not be filtered, and it can reach the cerebral cortex. This is the case when tinnitus is perceived. We explain to the patient that our brain sorts out signals according to their significance, giving important signals priority. Of particular importance are signals that are new, associated with emotional or unpleasant situations, related to survival, or a threat to health or life. Tinnitus meets such conditions, most often posing a threat to the quality of life. That is why people focus their attention on it.

We indicate to the patient that tinnitus is usually associated with negative emotions. It causes fear of hearing deterioration, brain tumor, burst blood vessel in the brain, psychological disorders, and so on. In addition, people cannot free themselves from this sensation, and very often the patient cannot find any effective help for it. On the contrary, health care professionals often offer the patient negative counseling, such as “Nothing can be done for tinnitus” and “You have to learn to live with it,” which makes the patient’s beliefs and concerns stronger. We explain to the patient that when this signal is labeled as something wrong or negative, the activation of the limbic system and autonomic nervous system increases. The signal of tinnitus is qualified as one of the most important tasks the brain needs to attend to. This results in enhanced awareness of this signal, which triggers the increase of tinnitus intrusiveness and annoyance. We emphasize very clearly that the degree of annoyance depends on activation of the limbic system and autonomic nervous system. To stress this, we discuss the patient’s parameters of tinnitus, indicating that the value of tinnitus loudness is usually very close to the hearing threshold, although it may be perceived as a very loud sound. We make the patient aware of a difference between someone who experiences tinnitus and someone who suffers from it.

At this time we summarize information, by answering the following questions.

**Q: Where is the most probable place of tinnitus generation in the patient’s particular case?**

**A: Most often we can indicate that dysfunction in the inner ear or damage to the outer hair cells is responsible for tinnitus generation.**
**Q:** What causes tinnitus?

*Answer:*
It results from the brain overcompensating (overreacting) to the presence of even a small abnormal activity in the auditory nerve. Tinnitus is not a sound; it is the perception of neuronal activity.

**Q:** Why can tinnitus be so troublesome?

*Answer:*
The degree of tinnitus annoyance depends on the brain’s interpretation of it, and successive activation of the brain’s systems responsible for emotions and reaction of the body.

**Q:** What are the main goals of directive counseling?

*Answer:*
To reassure the patient and decrease his or her negative reactions to tinnitus. Directive counseling seeks to neutralize the negative emotional associations and fears caused by tinnitus.

**Q:** How can this education help the patient?

*Answer:*
Education helps because understanding the causes and effects of tinnitus makes it less frightening. Most often tinnitus is a symptom of some disorder in the inner ear, and it is not connected with any serious disease.

**Q:** What is the next step in therapy?

*Answer:*
The next step is to initiate the process of habituation, to retrain the emotional and autonomic system to not be activated by tinnitus.

After the first part of counseling, patients usually feel much calmer and more secure. We then tell them that even if they accept that tinnitus does not threaten health or create any harm, the tinnitus will still be perceived. They may not be annoyed by tinnitus so much, but they can still hear it. Consequently, we explain to patients that our next goal is habituating the tinnitus perception.

**HOW DOES THE SENSORY SYSTEM OPERATE, AND WHAT RESULTS FROM THIS?**

We provide an overview about the regulation of our sensory system. We tell the patient that our sensory system works on detection and enhancement of contrast, and at the same time it adjusts amplification of incoming signals depending on their characteristics. In practical terms this means that the bigger the contrast with the environment, the easier the perception of the signal. For example, a small candle is a big stimulus for our vision in a dark background, whereas the same candle may go unnoticed in the daylight. We give similar examples here concerning different sensory subsystems to show the patient that the absolute strength of a physical stimulus is less important than its contrast against the background. It is easy for the patient to understand that the weak sound will be perceived clearly when there is no other sound around (a big contrast with the environment). According to this, a tinnitus-related signal coming from the inner ear will be easy to detect if the patient is in silence. At the same time, if there are no sounds around us, the brain will try to get any kind of information from the ear. In these cases, the central auditory system will strengthen every neuronal activity related to tinnitus. We talk about an experiment in which young people with normal hearing and without tinnitus started to perceive tinnitus while being in an anechoic chamber (an almost totally silent and echo-free room). We explain to the patient what happened in that situation. We tell the patient that all of us could potentially hear tinnitus if we were in an environment quiet enough, as a result of increased gain in the auditory pathways by the brain.
This also can lead to hyperacusis, which can reach an extremely high level so that the patient cannot tolerate normal everyday sounds. In the case of hearing loss, the gain in the central auditory pathways will increase in exactly the same way as with somebody remaining in a soundproof room.

Therefore, taking into consideration all these facts, our first goal will be to decrease gain within the auditory pathways. After increasing the level of acoustical background of the surroundings, tinnitus is supposed to merge with the background. At this point we hope the tinnitus ceases to be noticeable. Next, we discuss the ways we can facilitate this.

**WHAT SPECIFIC APPROACH TO SOUND THERAPY DO WE TAKE?**

We tell the patient that, because it is pivotal that each signal in the central nervous system is detected on the basis of contrast, we have to decrease the contrast between neuronal activity perceived as tinnitus and general background activity within the auditory system. This will reduce or even remove the tinnitus. According to this, the sound serves the purpose of reducing the contrast in hearing pathways between the tinnitus signal and the background sound. We tell the patient very clearly that he or she should not create the situation where the tinnitus signal is the only stimulus. Thus a strong emphasis is placed on the recommendation to “avoid silence.” What matters is the existence of the sound, not the source of it. It is important for the sound used during the training to be neutral (not to attract the patient’s attention) and set at the level below the mixing point. The sound may be produced by various devices such as an air-conditioner, radio, cassettes, and bedside sound generators. We make patients aware that they cannot habituate to something they cannot perceive. Consequently, complete masking of the tinnitus is prohibited. At the same time we remind patients to avoid loud sounds because the association between a loud noise and tinnitus has been known for many years.

We use Fig. 10–1A,B,C to teach patients the relation of the tinnitus signal to the acoustic background.

We indicate that patients should create a situation similar to that in Fig. 10–1C. We tell patients about the best way to decrease the contrast between tinnitus signal and background activity. This acoustic situation can “turn down tinnitus” after some time for patients in each category (Bartnik et al, 2001a). We finish directive counseling by explaining to patients the importance of enhancing the natural process of habituation, then decide on the best kind of devices for TRT sound therapy.

The next visit is arranged for fitting a hearing aid or noise generator.

**Choosing and Fitting the Most Suitable Hearing Aid, Hearing Aid with Noise Generator, or Noise Generator**

Patients from category II, who have subjective hearing loss that creates communication problems, are advised to use hearing aids with noise generators. If for some reason that is impossible, we recommend just hearing aids. From the beginning the patient is instructed that the hearing aid provides an additional auditory signal to facilitate habituation during the day and to improve communication
when it is needed. The hearing should improve immediately using a hearing aid, but it takes time to reduce tinnitus (Bartnik et al, 2001a). We explain to the patient that hearing loss reduces the sounds reaching the ear, and tinnitus comes to the foreground as a distinctive signal in hearing pathways. We repeat to the patient that a hearing aid can be used for two reasons: to improve the conditions for communication and to amplify the everyday noises that the patient has not been able to hear. If the environment is quiet, then it is necessary to add some sounds for the hearing aid to amplify, but always to the level below the mixing point. Using a hearing aid for communication usually reduces stress connected with hearing difficulties. Specific times listening to constant-level sounds just below the mixing point is recommended.

For patients from category I, III, and IV we advise using noise generators, generally on both ears. In the case of coexistence of hyperacusis and tinnitus, the therapy always starts with the hyperacusis. In the case of coexisting hyperacusis and hearing loss, we begin treatment of hyperacusis using noise generators. Using a low-level noise generator is a comfortable way of providing sound that decreases gain within the auditory pathway. We emphasize that noise from generators should never mask the patient's own tinnitus. It should always be set at the level between the hearing threshold and the mixing point. In category I, the sound from noise generators can be very close to the mixing point from the beginning. This situation is shown in Fig. 10–1C.

We always use open ear molds to avoid isolating ears from surroundings.
For category I patients:

- We adjust the volume to the mixing point and tell the patient that he or she has to be able to separate tinnitus from the sound of the instrument at the moment of fitting.
- We demonstrate to the patient how to set the generator very close to the mixing point in each ear.
- We explain how to use a noise generator, turn it on and off, and set the volume.
- We advise the patient to use the noise generator as much as possible (minimum 8 hours a day, preferably throughout the day).
- We tell the patient to put on the noise generator upon waking every morning.
- The instrument must be taken off at night, but the patient should have some other soft sound around the bed during the night.
- The patient is told to set the instrument at the mixing point and not to change the sound level even if he or she cannot hear the sound from the instrument because of another environmental noise. If tinnitus gets louder during the day, after the patient has set the noise generator, he or she should not increase the volume.
- The patient is told that the tinnitus may appear to worsen after he or she has worn the noise generator for a few weeks. This is only a temporary experience, however, and the patient should not worry about it.
- We repeat the recommendation to “avoid silence.” Low levels of background sound (below the mixing point) are recommended.

For category III and IV patients:

- We ask the patient to tell us when he or she begins to hear noise from the generator. For category IV patients, we set the volume at the hearing threshold; for category III patients, we adjust the volume slightly above that point.
- We ask the patient to repeat this activity for both ears because sometimes the level of noise can be a little different in each ear.
- We recommend that the patient not wear ear protection if he or she is used to wearing it; instead, ear protection should be worn only when the patient is exposed to loud noise.
- The rest of the fitting protocol includes the same recommendations as for patients from category I.

Follow-up Counseling According to Individual Needs of the Patient and Established Schedule

After providing the patient with hearing instruments, it is important to monitor the therapy. Category III and IV patients usually need to be seen more often.

On average we follow the following schedule of appointments.

4-week appointment

- Check if the patient is wearing the instrument(s) properly (volume setting, comfort of using, period of use).
• Listen to the patient’s questions and concerns and try to resolve them.
• Reinforce goals.

3- and 6-month appointments
• Check volume setting, time period of use, and comfort.
• Category III and IV patients may be asked to gradually increase the volume to the mixing point.
• Ask the patient if he or she has ever forgotten about the noise generator (indicates that habituation of the sound from the instrument has begun).
• Review counseling.
• Listen to the patient’s questions and concerns and try to resolve them.
• Reinforce goals.

12- and 18-month appointments
• Check volume setting, time period of use, and comfort.
• Change volume setting to the mixing point for category III and IV patients if the patients wear noise generators comfortably for most of the day.
• Assess subjective aspects of hyperacusis in category III and IV patients and observe if hyperacusis has ceased to be a problem.
• Repeat counseling.
• Listen to the patient’s questions and concerns and try to resolve them.

Usually after 24 months of therapy we let patients stop wearing the noise generators if they have shown that they do not need them anymore. In some cases patients do not want to part with the noise generators, and they are allowed to continue wearing them. Some are ready to live without generators only in the third year of therapy.

Conclusion
In our opinion, tinnitus retraining therapy has many advantages, including the fact that it is completely noninvasive. Following therapy, we have observed changes in tinnitus reaction, in tinnitus awareness, and in the particular life activities previously prevented or affected.

We realize that tinnitus retraining therapy has some weaknesses as well. It is time consuming in that it takes about 18 months for stable effects to become obvious. In addition, some patients do not get satisfactory results after this long period of treatment. TRT requires some patience and discipline from the patient and well-educated, experienced professionals to conduct it properly.

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References


Music and the Acoustic Desensitization Protocol for Tinnitus

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The Acoustic Desensitization Protocol\(^1\) is a new approach to rehabilitating patients who suffer from tinnitus. It utilizes music that has been spectrally modified according to each individual patient’s hearing characteristics to allow intermittent interaction with, or masking of, the patient’s tinnitus, stimulate auditory pathways across a full frequency range, and facilitate relaxation, all at a comfortable listening level. This customized acoustic therapy is provided together with in-depth counseling and education on the neurological aspects of the auditory system and the emotional responses associated with tinnitus.

The protocol proceeds in two stages. In the first stage, the acoustic stimulus facilitates a high level of interaction with the tinnitus, providing the patient with early benefits in the form of enhanced relaxation and relief from, and control over, tinnitus during periods of use. In the second stage, the protocol is adjusted so as to intermittently interact with (i.e., alternately mask vs expose) the tinnitus, and the level of tinnitus exposure is gradually increased over several months. Intermittent exposure to the patient’s own tinnitus signal within the relaxed setting created by the relaxation music (reinforced by the feeling of relief and control provided by the first phase of treatment) desensitizes the patient, leading to substantial reductions in awareness of, and disturbance by, tinnitus after 4 to 6 months of therapy. Concurrent intensive counseling helps to facilitate this process. A unique portable device has been developed that enables the treating clinician to incorporate the technique into clinical practice. This chapter gives an overview of the treatment’s underlying principles and rationale, as well as the recommended protocol.

\(^1\)Acoustic Desensitization Protocol is a trademark of Neuromonics Pty. Ltd.
Underlying Principles of the Acoustic Desensitization Protocol

An Acoustic Approach to Systematic Desensitization

Problematic tinnitus obviously affects both the entire auditory system and the emotional centers of the brain, often resulting in a “vicious cycle” involving the perception of tinnitus and one’s reaction to it (Coles, 1995; Hazell, 1995). Systematic desensitization is a psychological technique traditionally used for the behavioral treatment of phobias. The method usually involves the provision of muscle relaxation training, paired with a progressively graded exposure to the phobic item (Yulis et al., 1975). Desensitization to the phobic stimulus is achieved by gradually increasing exposure levels in the context of a deeply relaxed state, with the support of the therapist.

Tyler (1996) outlined the current range of tinnitus practices that have been referred to as desensitization. He was among the first to note that complete use of systematic desensitization procedures has yet to be incorporated into tinnitus rehabilitation practices. Tyler proposed that graded exposure to noxious external sound stimuli could be used under conditions of deep relaxation to treat tinnitus. This has not been widely applied in clinical practice so far, perhaps because noxious sounds may be too aversive for tinnitus sufferers. A basic tenet of the Acoustic Desensitization Protocol is that the perception of the tinnitus itself becomes the noxious stimulus progressively introduced during a relaxed state against a background of more palatable sounds. Patients are thereby exposed to their own tinnitus in a pleasant (instead of intrusive) context. To successfully apply the Acoustic Desensitization Protocol, both clinicians and patients need to be fully conversant with this critical notion.

The Use of Music in the Acoustic Desensitization Protocol

Music has been successfully applied in several therapeutic applications (Standley, 1995). The powerful affective response to music may be related to its nonverbal nature, which allows it to directly interact with the limbic system, bypassing slower linguistically based processing in the auditory cortex (Critchley and Henson, 1977). Its use to facilitate systematic desensitization to tinnitus by employing the dynamic nature of the music to intermittently mask the perception of tinnitus is a novel application. In this approach, music further provides a relaxation stimulus that tempers the limbic/autonomic reaction as well as an auditory stimulus that activates auditory pathways across a wide frequency range. By enhancing relaxation when the tinnitus would otherwise prevent it, music helps patients to change their attitude to tinnitus.

Stimulation across a Broad Frequency Range via Customized Spectral Modification

The Acoustic Desensitization Protocol provides an audible acoustic stimulus across as wide a frequency range as possible, including over 12 kHz. The intention is to stimulate all auditory pathways so as maximize neuroplastic change.

Most tinnitus sufferers have hearing loss in the high frequency ranges (Davis, 1998), above the normal speech range frequencies that are typically measured.
Consequently, the broadband signals used in tinnitus therapy are unlikely to provide optimal stimulation for these patients (Baguley et al., 1997).

In the Acoustic Desensitization Protocol, spectral modification of music signals also adjusts for the typically low-frequency emphasis in music’s spectral composition. **Fig. 11–1** illustrates the spectral properties of a music recording averaged over 64 seconds, compared with the mean hearing threshold levels of a cohort of 80 tinnitus patients (Davis et al., 1999), matched at 4 kHz. The music waveform illustrates that the greatest energy is centered between 200 Hz and 2 kHz, with little energy (on average) above 3 kHz. Among the typical sample of tinnitus patients, hearing thresholds decline substantially above 3 kHz. With such patients, in the absence of spectral modification, the lower frequency components of the music would need to be quite loud before the higher frequency components could be adequately perceived. Even patients with normal hearing across the entire frequency range benefit from spectral modification as a result of the low-frequency bias of most music.

Use of earphones ensures provision of a calibrated “dose” without attenuation of the very high frequency signals over distance through the free field.

For the Acoustic Desensitization Protocol, the acoustic signal is spectrally modified in a tailored and patented manner according to each patient’s audiogram using customization algorithms developed by the author and fine-tuned over several clinical trials (Davis 1998; Davis et al., 2002b). Signal customization, together with the use of high-fidelity earphones, ensures that, at a comfortable listening volume, even stimulation is provided across a wide frequency range despite any hearing loss.

Tinnitus patients often experience loudness discomfort levels that are lower than what would be expected for their particular level of sensorineural hearing loss (Coles and Sood, 1988; Stouffer and Tyler, 1990; Tyler and Conrad-Armes, 1983). The aforementioned algorithms are calibrated to account for these abnormally steep loudness growth characteristics, particularly in those with minimal to moderate hearing loss.

![Figure 11–1 Spectral characteristics of typical unmodified music versus hearing thresholds of tinnitus patients.](image)
Adjustment for Asymmetrical Hearing Loss and Importance of the Stereo Effect

With the intention of stimulating the integrative pathways of the auditory system, the spectral modification is undertaken in a manner that accounts for any asymmetry in hearing thresholds across the two ears and provides the acoustic stimulus in full stereo. This contrasts with the uncorrelated signals provided by bilateral tinnitus maskers or hearing aids. This stereo effect may explain why this approach has been found to provide an effective masking stimulus to those patients who report “central tinnitus” and who were unable to achieve masking with other devices (Davis, 1998).

Staged Treatment Delivery

Consistent with the graded increase in exposure that is provided in a systematic desensitization protocol, the treatment is delivered in two stages:

1. Spectrally modified music (with noise) is initially used to achieve a high level of interaction with the tinnitus.
2. Spectrally modified music (without noise) allows intermittence of the interaction (masking vs exposure); the degree of exposure is gradually increased by decreasing the volume over several months.

In the first stage, music has noise added to facilitate a high level of interaction at a comfortable listening level. The sound of this noise is often described by patients as a light “shower sound.” The source recording of this noise band is embedded in the music at a predetermined signal-to-noise ratio, and this mix is then individually customized. The ability to achieve a high level of tinnitus interaction provides patients with a sense of relief and control over the tinnitus, and promotes a reduction in general anxiety levels.

In the second stage, the tinnitus is masked during peaks in the music; during the troughs, the tinnitus is momentarily exposed. Reducing the volume of the music over time gradually increases these exposure times. Through repeated, momentary exposure, in the context of a relaxation stimulus, the patient gradually becomes desensitized to the tinnitus signal. Over time, this results in reduced awareness of, and disturbance by, the tinnitus.

Counseling

The principles underlying the counseling approach used in the Acoustic Desensitization Protocol are outlined later in this chapter.

Implementation of the Acoustic Desensitization Protocol

Overall Treatment Flow

Fig. 11–2 depicts the typical treatment flow.

The process begins with diagnostic tests to determine hearing thresholds, minimum masking levels, tinnitus pitch match, residual inhibition, and loudness discomfort levels. In addition, patients are educated as to the likely pathogenesis
of their tinnitus. A purpose-built device\textsuperscript{2} is then prescribed with embedded acoustic therapy customized for the patient and provided with instructions for use so as to provide a high level of interaction. The patient’s response is checked around 2 weeks later, and any difficulties that the patient may be encountering in using the device are discussed and resolved. After a further 6 weeks (subject to patient readiness), the stage 2 acoustic signal is provided, and patients are instructed in its use to provide intermittent interaction with their tinnitus.

Progress review appointments should include the measurement of audiological and psychometric parameters to monitor progress and provide positive feedback to the patient. The clinician may sometimes find the need to supplement the minimum number of visits, particularly during the early weeks of therapy, to ensure appropriate compliance to the protocol.

\textsuperscript{2}Neuromonics Pty. Ltd. (www.neuromonics.com) provides a purpose-built processor for use with the Acoustic Desensitization Protocol.

\textbf{Figure 11–2}  Acoustic Desensitization Protocol treatment flow. ENT, ear, nose, and throat specialist.
Patient Candidacy and Selection

The Acoustic Desensitization Protocol is suitable for patients with a wide range of hearing characteristics. Those occasional patients with hearing within the normal range at all frequencies bilaterally still tend to benefit from this approach because spectral modification overcomes the low-frequency emphasis of music. Those with a severe or profound bilateral hearing loss are not clear candidates because they might benefit more from hearing aids or cochlear implants. Patients with a severe or profound unilateral hearing loss can be helped using contralateral stimulation, although the presentation level tends to be somewhat higher than binaural cases. Their candidacy should be verified by contralaterally performing the minimum masking level tests to determine up front if a masking-type interaction is possible at a comfortable listening level.

Those patients with clinically significant depression may find it difficult to adhere to the treatment regime without additional psychological or psychiatric intervention and support. With such patients, tinnitus-specific counseling may continue concurrently, and the use of this acoustic therapy (with a high level of interaction) can be promoted as a crisis management tool that helps them sleep and feel more in control of their tinnitus.

Some professionally trained musicians do not respond as well to music-mediated therapy, perhaps as a result of an intellectual response to the music, which interferes with their relaxation response. With such patients, the treating clinician needs to emphasize the need to strive to place the music into the background of their consciousness. As an alternative to music, spectrally modified environmental noise recordings, particularly those incorporating beachside wave sounds, may be considered.

Tests and Measures

A pure-tone audiogram, including thresholds at 10 and 12 kHz, needs to be recorded for all patients. For counseling reasons, the author routinely measures tinnitus pitch match, loudness balance, residual inhibition, minimum masking levels, and loudness discomfort levels. The latter two measures are also repeated as objective mid- and post-therapy indices, along with psychometric indices such as the Tinnitus Reaction Questionnaire. Loudness discomfort level measurement has been adapted to avoid any exacerbation of tinnitus through exposure to loud noise; the adapted approach defines “uncomfortably loud” as the level that would be uncomfortably loud if it had to be listened to for more than a minute (but it is presented for only a few seconds).

Device Setup

The acoustic signal in the Acoustic Desensitization Protocol is administered via a portable device that has been designed to promote optimal treatment. Prior to fitting of the device, the customization and programming of the device are conducted by the manufacturer. This device is displayed in Fig. 11–3.

Use of Earphones

The use of high-fidelity earphones is essential for the Acoustic Desensitization Protocol to be effective. The “open-air” types of earphones are more suitable
than the “sound-insulating” types, which tend to increase perception of the tinnitus and cause straining to hear important outside sounds. To enable the patient to easily identify the correct transducer for each ear while in the dark, the earpieces need to be a different shape for each side. Importantly, patients need to be warned against changing earphones during treatment. This is because different models of earphones display differing frequency response characteristics, and the spectral modification algorithms are calibrated for the specific model of earphones recommended for the patient.

**General Guidelines for Use of the Device**

A critical aspect is to provide clear instructions to patients about the use of the device and the rationale for the protocol. This motivates them to use the device sufficiently often and without impediments, and sets realistic outcome expectations.

The patient is advised to use the device when the tinnitus is most disturbing, which is typically in the quieter times like sleep onset, premature waking, reading, contemplating, or relaxing. After they have been heard several times, the customized stimuli can be used while reading or writing. The presentation level is usually low enough that patients can still hold a conversation with the stimulus playing, so the earphones do not need to be removed for short communication exchanges.

Recommended use is at least 2 hours daily. However, for the first 2 to 4 months, usage of 3 hours per day is better, and patients should be encouraged to try for somewhat longer if possible. The device is lightweight and compact (similar in size to many mobile phones), allowing it to be carried around for use during daily activities.

![The Acoustic Desensitization Protocol device](image)

*Figure 11–3* The Acoustic Desensitization Protocol device (courtesy Neuromonics Pty. Ltd.).
As the tinnitus becomes progressively less disturbing, the device can be used correspondingly less, until the patient feels it is no longer necessary. It is likely that patients will want to keep the device “just in case.” Sometimes the tinnitus disturbance can reappear due to conductive pathology, periods of significant stress, or noise exposure, so additional stimulation may be desired to further treat the tinnitus under such circumstances.

Clinicians should check usage carefully at review appointments because one of the most common causes of substandard progress is insufficient use of the device. Impediments to obtaining sufficient stimulation may need to be determined, and creative strategies for circumventing them devised.

VOLUME SETTING DURING STAGE 1 THERAPY

The specific volume-setting instructions depend on the stage of therapy. During stage 1, a high level of interaction is prescribed. The volume control should be set at the beginning of the session so that the combined music/noise signal just “covers up” the tinnitus, provided that at all times the volume is set at a comfortable level.

Most people find that the more they listen, the less likely they are to be consciously aware of the music. Constant monitoring of either the volume level or the tinnitus can be counterproductive to the ultimate goal of reducing distress and awareness. To help prevent this, patients should be instructed to engage in another quiet activity while the music is playing in the background, such as reading, computer work, walking, gardening, and quiet household activities.

After around 2 months of use, patients typically report feeling that they are now in control of their tinnitus, or at least in control of those aspects that were interfering with their lifestyle, thus signaling successful completion of phase 1.

TRANSITION TO STAGE 2 THERAPY

To facilitate the desensitization process, some exposure to the tinnitus signal is required, so in phase 2, the protocol is adjusted to provide intermittent interaction with the tinnitus. At the beginning of each listening session during this phase of treatment, the volume should be set so that the tinnitus is covered up during the medium to louder passages, and is momentarily apparent during the softer passages, as depicted in Fig. 11–4.

Clinicians should instruct patients to always set the volume at the beginning of each therapy session to ensure that their tinnitus is covered up only around half of the time. It is critical that patients understand that after the first minute or so, they should not monitor the level of interaction or reset the volume until the beginning of the next therapy session. Patients typically find they have been progressively lowering the volume from month to month, and this tends to be reflected in repeat audiometric measures of minimum masking levels using broadband noise. Toward the end of stage 2, the music volume setting can be quite low.

Counseling

Following is a brief outline of the elements underlying the counseling approach that has been used as part of the Acoustic Desensitization Protocol. Some of the elements have been inspired by existing counseling models, such as systematic desensitization of phobias, cognitive therapy, psychosocial counseling, common
rehabilitation strategies from cochlear implantation/hearing aids, and sound therapies for tinnitus, including tinnitus total masking and tinnitus partial masking therapy (e.g., Hazell, 1995; Tyler and Babin, 1986; Vernon and Schleuning, 1978) and tinnitus retraining therapy (Jastreboff et al, 1994), as well as music therapies. Other aspects have been derived from clinical experience with the protocol.

CORE COUNSELING STYLE

Counseling is considered to be an interactive dialogue with the patient that needs to acknowledge the person’s particular circumstances and immediate responses to material being presented. Counseling needs to be tailored to the individual, taking into account his or her particular educational level, personal style, cognitive functioning, level of preconditioning, and so on. The overall intention is to provide a nurturing environment in which patients can describe their experience of tinnitus and their emotional reaction to it. The clinician needs to provide an unconditional positive regard, actively listening, and making skillful use of questioning to elicit more information when it appears relevant.

The collaborative dialogue can begin with questioning on several topics, such as how the patient feels about the tinnitus and how he or she got it, how the patient has been diagnosed and treated so far, the patient’s expectations for the future, and so on. Many patients report that they feel relieved in being able to share their experience with someone else who is sympathetic, and they can take great comfort in hearing that they have not been alone in having these experiences and feelings. This process can be therapeutic in that the patient needs to reconsider his or her experience from the perspective of someone new, ordering the

Figure 11–4  Schematic representation of intermittent interaction instructions.
component parts of that experience in a new way that gives the “big picture” for both clinician and patient. It also is a useful period in which rapport can be developed before cognitive restructuring begins, and written notes should be made with regard to any apparent unproductive cognitive distortions that may need addressing later on.

DIAGNOSIS

The case history helps to determine the likely cause(s) of tinnitus and the major exacerbating factors, and also helps to orient the patient to the more important aspects of his or her history and current lifestyle that are influencing the tinnitus experience. The patient is asked to complete the comprehensive case history questionnaire by mail a week or so prior to the initial appointment. This gives sufficient time to check medications and talk with the patient’s family and medical practitioners about such items as noise history and previous diagnoses. These written responses are then reviewed by the clinician in the presence of the patient, clarifying and elaborating each answer.

The audiometric measurement of the tinnitus also gives the patient an opportunity to describe his or her tinnitus in a supportive and understanding atmosphere. By sharing this with others, it helps acknowledge that the patient’s experience is phenomenologically real. The clinician’s explanation of the tinnitus and hearing loss measurements sets the scene for a dialogue aimed at understanding the specific effects of the patient’s condition, such as the ramifications of having a hearing loss only for the higher frequencies. The patient’s minimum masking levels, loudness discomfort levels, and loudness balance results are also a useful starting point for the description of the central auditory amplification hypothesis. Without a reliable reference to benchmark their tinnitus to, many sufferers find it difficult to gauge their progress in response to therapy. For this reason, a repeat administration of the psychometric and audiometric indices at progress reviews can be very heartening.

EDUCATION

The clinician needs to explain all the pertinent aspects of the patient’s particular case history in terms of a model of tinnitus pathogenesis that is credible to the patient. The process should thus provide a detailed explanation of normal auditory system functioning and emphasize the role of the cochlear nerves, brainstem, auditory cortex, and limbic system. The inherent plasticity of the auditory pathways needs to be emphasized because this is the basis of the reasoning given for how neurological changes might ultimately be effected.

The details of the patient’s specific dysfunction should then be explained in similar terms, and this description should be constantly referred back to the particular case history features. For example, if the participant has an extensive history of noise exposure and a corresponding hearing loss configuration, then it needs to be explained why he or she may only have become aware of it after a bout of influenza (the neurological noise floor being uncovered by additional hearing loss, then increased adaptive efferent activity, etc.). A box diagram (e.g., Jastreboff et al, 1996) can be a convenient way to “compartmentalize” the various aspects of tinnitus pathogenesis and their interrelationships.
IDENTIFICATION AND CHALLENGING OF COGNITIVE DISTORTIONS

Direct questioning should be used to identify the presence of cognitive distortions, such as “My tinnitus will get worse” or “go on for ever,” “Tinnitus is a physical disease,” “There is no treatment,” “I will be deprived of sleep because of my tinnitus,” “Tinnitus will make me go deaf,” “Tinnitus will make me go mad,” and “Tinnitus is caused by a tumor.” Alternative perspectives can then be offered and a rationale given, but care should be taken to remain collaborative rather than directive.

DEVICE-SPECIFIC INSTRUCTION

A careful description of the aforementioned principles of systematic desensitization is required, as this is the basis of the progressive changes in volume control setting. The device usage instructions need to be first covered verbally, then provided to the patient for at-home reference.

GOAL SETTING AND EXPECTATION MANAGEMENT

The incremental nature of likely benefits needs to be clearly understood, and the fact that this is not a “magic overnight cure” may require constant reiteration. Patients should be counseled to expect distinct benefits over the duration of treatment. Early on, they can expect an enhanced ability to relax and sleep, plus a sense of relief, as they can now use the device at those times when otherwise they would be disturbed by their tinnitus. This is followed by the development of a sense of control over the tinnitus, with a corresponding reduction in the fear of the tinnitus because the lifestyle impediments previously faced are reduced. Then, over a period of several months, they can expect to experience gradual desensitization, whereby there is a gradual reduction in the percentage of the time that they are generally aware of the tinnitus until over time it ceases to be disturbing. The expectation should be that this will be an incremental process over some months, mediated by the degree of effort that they contribute to the process.

Patients can benefit from collaboratively devising a written plan of specific goals and actions. These provide a useful way to set realistic expectations and tangible milestones and can be referred to at periods of crisis or indecision, or otherwise as inspiration (Davis, 1999).

NURTURING EXPECTATIONS

The deliberate nurturing of patient expectations has the potential to greatly improve the treatment process (Tyler et al, 2001). Accordingly, with the Acoustic Desensitization Protocol, the patient’s expectation of a positive prognosis is nurtured with reference to the results of previous clinical trials of the approach, which reveal a high rate of success. This is typically reinforced by the patient’s experience of benefits early on in treatment. Patients benefit greatly from an explanation of the typical physiological response to relaxation music, with respiration rate slowing and heartbeat slowing to match the meter of the music; by recognizing these effects, the efficiency of their relaxation response can be increased, consistent with biofeedback techniques.
GENERAL TINNITUS MANAGEMENT STRATEGIES

In addition to the use of the customized acoustic therapy, which, among other things, promotes relaxation, more general sleep hygiene practices should be recommended, including avoiding naps, increasing exercise levels, preventing clock watching, adopting a lunchtime “worry time,” and reducing excess caffeine consumption (Davis and Wilde, 1995). Other generally accepted tinnitus management strategies, such as management of general stress levels, should also be outlined.

Consistent with tinnitus retraining therapy (Jastreboff et al, 1996), the avoidance of total silence is strongly promoted, with the customized device advocated as the most frequently used tool to enable this. The Acoustic Desensitization Protocol diverges from tinnitus retraining therapy in that it promotes the use of the device (with a high level of interaction) as a coping aid initially, although only on an interim basis. The rationale for this is that using tools to reduce the lifestyle-disturbing manifestations can reduce fear of the tinnitus and thereby facilitate progress with treatment. Furthermore, the ability of music to engage the limbic system in a positive way appears to facilitate relaxation and attitudinal change in a more effective manner than the use of emotionally neutral noise.

IMPORTANCE OF WRITTEN MATERIAL

Tinnitus patients cannot be expected to recall all that is covered in counseling. The concurrent presence of hearing loss makes reliance on verbal counseling particularly challenging. As a result, provision of written summaries of the main points of therapy is advised.

THERAPY TROUBLESHOOTING

If patients do not appear to be progressing reasonably in terms of measurable changes in repeated psychometric and audiometric measures, several questions can be asked to determine if there are specific factors limiting treatment effectiveness, as follows:

1. Is the device being used for long enough each day?
2. Is the patient using it at those times of the day when the tinnitus is most disturbing, which would typically be in the quieter times?
3. Is the patient setting the volume in a manner that is consistent with the protocol?
4. Is the patient “listening in” to the music too much (i.e., not placing music in the background of consciousness)?
5. Has the patient recently had a cold, flu, allergy, or eustachian tube dysfunction?
6. Has the patient begun any new medication or changed the dose of existing medication?
7. Has the patient had excessive noise exposure lately?
8. Has the patient had extended periods of straining to hear clearly?
9. Has the patient had a period of acute stress?
10. Is there anything else that the patient thinks may have inhibited his or her progress?
11. Has an improvement occurred so gradually as to not be immediately apparent?
12. Are the patient’s expectations for a speedy improvement reasonable?
**Expected Outcomes: A Case Study**

The effectiveness of the Acoustic Desensitization Protocol has been demonstrated in several clinical trials (e.g., Davis et al., 2002a). A typical case study from a recent trial is described below.

Mr. X was a 62-year-old teacher who presented with a left-sided hissing tinnitus, which had a sudden onset a year prior to his referral to the university tinnitus clinic. It was significantly interfering with his reading, lesson planning, and sleep onset/maintenance. There were also pronounced bilateral sound tolerance problems, with even some telephone conversations being uncomfortably loud.

A mild to moderate mid- to very high frequency sensorineural hearing loss was found, and was 15 dB worse on the left for the midfrequencies (Fig. 11–5). The tinnitus was matched to a narrowband noise centered around 6 kHz, an octave below the maximal hearing loss frequency. The broadband noise minimum masking level was quite high at 20 dB SL, and loudness discomfort levels were found to be markedly low (normally ~95 dB). These measures suggested a high-magnitude tinnitus and hyperacusis.

During treatment, as is the case with many patients, Mr. X had to be reminded at progress reviews to reset his volume settings at the commencement of each listening session to ensure the appropriate level of interaction was attained. He also then needed reminding not to constantly monitor the volume level once it was initially set at the beginning of each therapy session.

After 2 months of stage 1 therapy, working, sleeping, and tolerance of external sounds had markedly improved, and these were reflected in the audiometric and psychometric data obtained, as summarized in Fig. 11–5 and Table 11–1. After 2 months of stage 2 treatment, further improvements were reported. Mr. X reported
that he was now only rarely aware of his tinnitus while the device was not in use, and not at all while using it. He was not often very conscious of the music while it was playing, but it still seemed to evoke a strong relaxation response.

**Conclusion**

The Acoustic Desensitization Protocol constitutes a new technique that incorporates principles of systematic desensitization, habituation therapy, music therapy, and clinical psychology. Pivotal to its application is the use of an individually customized, spectrally modified acoustic stimulus that provides an intermittent interaction with the tinnitus while simultaneously facilitating a relaxation response. Comprehensive counseling is also an essential aspect. If applied according to the protocol described herein, clinicians can expect to produce large improvements in most clinical measures over a period of several months with a relatively modest amount of contact time.

**References**


Davis PB. Music as therapy in the rehabilitation of tinnitus sufferers: effects of spectral modification and counseling. [Ph.D. dissertation]. Perth, Australia: School of Speech and Hearing Science, Curtin University of Technology; 1998

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**TABLE 11–1 Case Study’s Other Audiometric and Psychometric Measures**

<table>
<thead>
<tr>
<th></th>
<th>Prior to Treatment</th>
<th>After 2 Months of Treatment</th>
<th>After 4 Months of Treatment</th>
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<tr>
<td>Minimum masking level</td>
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<td>10</td>
<td>2</td>
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<tr>
<td>dB SL</td>
<td></td>
<td></td>
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<tr>
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<td>4</td>
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</tr>
<tr>
<td>VAS-relaxation levels</td>
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<td>4</td>
<td>1</td>
</tr>
<tr>
<td>VAS-decreased sound</td>
<td>5</td>
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<td>1</td>
</tr>
<tr>
<td>tolerance</td>
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<td></td>
<td></td>
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<tr>
<td>Awareness of tinnitus</td>
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<td>40</td>
<td>10</td>
</tr>
<tr>
<td>(% of time)</td>
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</tbody>
</table>

*db SL, decibel sensation level (i.e., loudness relative to hearing threshold); TRQ, tinnitus reaction questionnaire composite score (Wilson et al, 1991); VAS³, Visual Analogue Scale.*


Tyler RS. Tinnitus treatments modify behaviour. Hearing Instruments 1996;March:20–24


Hearing aids have long been considered useful tools in tinnitus management (Saltzman and Ersner, 1947). They have been used for total and partial masking therapies (Coles, 1985; Hazell et al, 1985; Vernon and Meikle, 2000; Von Wedel et al, 1998; see also Chapters 1 and 13 in this book), including tinnitus retraining (Jastreboff and Hazell, 1993; Jastreboff and Jastreboff, 2000; see also Chapter 10), and as adjuncts to the psychological management of tinnitus (Hallam et al, 1984). In a survey of tinnitus patients over one third of respondents reported that the primary benefit of attending a specialized tinnitus clinic was the fitting of hearing aids (Sanchez and Stephens, 2000). This chapter will briefly consider the existing literature on the use of hearing aids for tinnitus management before focusing on the practical aspects of fitting these instruments for treating tinnitus.

How Hearing Aids Help Reduce Tinnitus

There are at least five ways the fitting of hearing aids can benefit tinnitus sufferers (Coles, 1985):

1. Assisted hearing has psychological benefits.
2. Less attention is paid to hearing, and consequently tinnitus.
3. Patient comes to understanding that hearing loss is the main cause of communication problems, not tinnitus.
4. Ambient noise and internal circuit noise can make the tinnitus less audible.
5. The counseling accompanying hearing aid fitting can provide an understanding of tinnitus.

In addition, the sounds amplified by hearing aids produce neural activity throughout the auditory system, which interfere or compete with the central auditory representation of tinnitus (whatever form it may take; see Chapter 1), and divert attention to complex sounds of greater importance or interest, such as speech and music (Andersson, 2002).
Few studies have been published on the success rate of hearing aid fitting in managing tinnitus. Surr et al (1985) reported that \( \sim 50\% \) of hearing aid patients achieved some relief from tinnitus, and Surr et al (1999) found an average 10% improvement in tinnitus handicap 6 weeks following the fitting of hearing aids. In contrast, Melin et al (1987) concluded that hearing aids alone were not effective devices for reducing tinnitus. The, at best, modest success of hearing aids in those studies must be placed in context; predominantly linear hearing aids were fitted in a conventional manner solely to improve hearing. Through careful selection of hearing aid characteristics and by fitting the hearing aids with the intention of reducing tinnitus audibility, the likelihood of a reduction in tinnitus may be increased.

**Protocol for Using Hearing Aids to Help Reduce Tinnitus**

The tinnitus management protocol suggested here places an emphasis on the comfortable amplification of speech to divert attention paid to tinnitus, as well as amplification of ambient sound to reduce tinnitus audibility. The initial goal is partial masking using amplified ambient sound and speech. The long-term goals are to reduce the amount of attention paid to tinnitus and to consequently reduce tinnitus awareness.

The protocol involves five or six 1-hour appointments. An additional appointment at 6 months assesses progress and addresses patient concerns. The protocol comprises the following elements:

1. Diagnostic audiology and tinnitus evaluation
2. Counseling
3. Instrument selection for sound therapy
4. Instrument fitting
5. Follow-up

Some elements within the protocol, such as the assessment of tinnitus and counseling, will be discussed only briefly here because they have been covered in detail elsewhere in this book, are common to most tinnitus therapies, and are not the focus of this chapter.

**Diagnostic Audiology and Tinnitus Evaluation**

The first step in the evaluation of tinnitus and then its management is a comprehensive case history, including questions of onset, description, location, possible cause (noise, medications, stress), and severity. If the tinnitus is objective, pulsatile, unilateral, or associated with a temporomandibular joint complaint, referral to an otolaryngologist is made. If the patient is experiencing anxiety or depression, referral to a psychologist is organized.

The assessments of hearing and tinnitus undertaken are consistent with standard audiological practice and are similar to those used at other tinnitus clinics (Jastreboff and Jastreboff, 2000; Sandlin and Olsson, 1999). In addition, self-report questionnaires—for example, Tinnitus Severity Index (Meikle et al, 1995) and the Tinnitus Handicap Questionnaire (Kuk et al, 1990)—assist in identifying the most bothersome aspects of the individual’s tinnitus that need to be addressed by counseling and possibly sound therapy. These results are used to identify specific areas of tinnitus impact to be discussed at counseling sessions.
Counseling

Counseling should be considered a tinnitus management strategy in its own right as well as an adjunct to other management strategies, including hearing aid fitting. To be successful in counseling the tinnitus sufferer, the clinician should have extensive knowledge of the physiology of the hearing system, tinnitus mechanisms, and management. First and foremost the counseling should provide reassurance and correction of false beliefs (e.g., Hazell, 1999). The counseling session typically involves family members or friends, as well as the patient, and comprises the elements recommended by Wilson et al (1998) and others (see Chapter 1). A client-centered approach is used with greater discussion of those areas important to the tinnitus sufferer (see Chapter 15). The clinician must assess the level of understanding of the patient and adjust the counseling appropriately. A counseling session is wasted if the patient does not understand the information provided. The session is facilitated by a slide show presentation of

- Cochlear anatomy and pathology
- Hearing loss
- Auditory pathways and central auditory processing of sound
- Tinnitus mechanisms
- Conditioned responses
- Tinnitus management options
- Stress and anxiety
- Attention distraction strategies

Written information is given to the patient detailing key points and referral sources for stress management. Pen-and-paper exercises explaining tinnitus and its management are completed by the patient and his or her audiologist. The mechanism of tinnitus generation, which is explained to the patient, is related back to the individual's audiological and tinnitus evaluation. Typically, patients are told that

- Most tinnitus appears to be the consequence of the auditory system's interpretation of altered activity from the inner ear.
- Unevenness in the spontaneous (background) output of the cochlea may be exaggerated by central auditory processing, which can eventually lead to a change in the functional organization of the auditory cortex.
- Tinnitus severity is not fully explained by the degree of ear damage because there is poor correlation between hearing threshold and tinnitus distress.
- It is thought that much of the severity of tinnitus relates to enhancement by central auditory processing and the individual's reaction to the abnormal perception.

Patients are counseled as to the various tinnitus therapies available at the clinic and other clinics. The premise of using hearing aids, sound generators (maskers), and combination devices for reducing tinnitus audibility are discussed. Patients are told that

- Hearing aids should improve communication and divert attention from the tinnitus.
- Hearing aids also amplify background sound, which should decrease the prominence of the tinnitus.
Patients should enrich their listening environment with music or other sounds to divert attention away from the tinnitus and to partially mask it. A selection of sounds (white, pink, and brown noise and nature sounds) is available on a digital music playback system from the clinic for this purpose.

Sound therapy using hearing aids and an enriched listening environment may interfere with the central processing of the tinnitus, leading to reduced awareness of the tinnitus.

To focus counseling and determine goals and realistic expectations for management, a version of the Client Orientated Scale of Improvement (COSI; Dillion et al, 1999) is used. The original COSI assesses patients’ communication needs and outcomes achieved following the fitting of hearing aids. Using the Client Orientated Scale of Improvement in Tinnitus (COSIT), the clinician and patient identify specific situations in which tinnitus is bothersome (e.g., “Tinnitus affects my ability to concentrate at work”) and means of reducing tinnitus in these situations (e.g., amplify sound to reduce tinnitus audibility). At stages throughout the tinnitus rehabilitation process the problems identified using the COSIT are reexamined, and improvement in tinnitus in each situation is determined. If improvement is not shown, appropriate steps are undertaken to address the problem until realistic goals are achieved.

**Instrument Selection for Sound Therapy**

Our approach for determining hearing aid candidacy is similar to that of Vernon and Meikle (2000, p. 328): “If the patient has hearing impairment, always try hearing aids first regardless of the nature and extent of the hearing loss.”

Unless the patient has normal pure-tone audiometry or hearing loss confined to greater than 6 kHz, hearing aids are the instruments initially trialed. Hearing aids are not fitted to those individuals with hearing loss confined to above 6 kHz due to the limited high-frequency amplification provided by most hearing aids. When the individual has normal hearing (5% of patients at our clinic), ear-level sound generators are provided and fitted in a manner similar to that recommended by some of the partial masking therapies (see, e.g., Chapters 1, 10, and 13), or are considered for the acoustic desensitization protocol discussed in Chapter 11.

When selecting hearing aids, the aim is to find devices that will achieve the dual, but potentially antagonistic, goals of improving the audibility of speech and amplifying ambient sound to interfere with tinnitus. To meet both goals, we often use multiple program hearing aids, with one program dedicated to tinnitus management. This tinnitus program incorporates features desirable for tinnitus management; namely, those that enhance perception of quiet environment sounds without sacrificing listening comfort.

**Desirable Hearing Aid Features for Tinnitus Management**

The pros and cons of different hearing aid features are discussed following here, with a view to assist in the selection of hearing aids for managing tinnitus. Not all features of modern aids are beneficial in tinnitus management.
Open Fitting  Open fittings reduce occlusion and increase user comfort, which is important if the patient is to become accustomed to the aids. Reduction in environmental sound, from blocking the ear canal, can result in increased tinnitus awareness (Sheldrake et al, 1996). Although behind-the-ear aids and open ear molds are often recommended, the fitting of in-the-canal and completely-in-the-canal hearing aids is often successful when open venting is used. Although large vents in in-the-ear aids can increase the risk of acoustic feedback, the feedback management algorithms available in many of today’s aids enable greater venting than was previously possible. With some aids, however, the feedback management occurs at the expense of a reduction in gain, possibly increasing the audibility of the tinnitus. There are also occasions in which less venting is appropriate, such as low-frequency hearing losses (Tyler and Bentler, 1987). The conflicting merits of open fittings and desired amplification levels need to be considered with every fitting. Measurement of the real-ear occluded response (Hawkins and Mueller, 1992) allows a means of checking if attenuation of external sounds is too great. If ambient sound is at all attenuated, attempts should be made to increase venting or adjust aid settings to provide extra amplification of soft sounds.

Compression and Expansion  Low-compression kneepoints enable the amplification of low-intensity environmental sounds to audible levels without causing discomfort to louder sounds. Understanding the degree to which a particular hearing aid, or aid setting, results in the amplification of low-intensity sounds is fundamental to knowing how to adjust hearing aids to reduce tinnitus audibility. Fig. 12–1 illustrates a loudness growth function for a normal-hearing person and a hearing-impaired person, superimposed with an ambient noise level of 30 dB SPL (Fig. 12–1A) and input/output curves for a hearing aid with similar compression characteristics, except varying kneepoint from 30 (Fig. 12–1B) to 50 dB SPL (Fig. 12–1C). If the amount of gain to moderate inputs is maintained and the kneepoint is lowered, the level of ambient noise perceived should increase. Wide dynamic range compression with low-compression kneepoints (20–45 dB SPL) is recommended. Circuit noise, long thought of as an ally in tinnitus management (Tyler and Bentler, 1987), is often inaudible in digital hearing aids due to expansion or “soft squelch.” Expansion results in a more rapid reduction in gain below the kneepoint than in conventional compression (Fig. 12–1D). The goal of expansion is exactly the opposite of what is desirable for reducing tinnitus audibility in quiet: the reduction of ambient sound and circuit noise. The effect of reducing the compression kneepoint on the amplification of ambient room noise is shown in Fig. 12–2.

Multiple Microphones and Noise Reduction Algorithms  Switchable microphones (directional/omnidirectional modes) enable optimization of options for a patient wishing to hear speech in background noise (May, 1998; Ricketts and Mueller, 1999) and allow change to omnidirectional hearing to take maximum advantage of diffuse ambient noise for tinnitus management. Noise reduction digital signal-processing algorithms monitor temporal and spectral characteristics of sound and attempt to reduce amplification in channels in which speechlike stimuli are not
present (Schweitzer, 1997). Digital noise reduction in hearing aids has yet to be proven effective in improving speech recognition in noise, but it may improve listening comfort through reduced amplification in noise (Bray and Nilsson, 2002; Trine and Van Tasell, 2002). However, these algorithms also effectively reduce the ambient sounds used to partially mask tinnitus (Fig. 12–3). Our preference is for hearing aids in which noise reduction features can be turned off and omnidirectional characteristics selected when in quiet environments.

**Figure 12–1** The rationale behind choosing a low-compression kneepoint for amplification of ambient sound. Input/output curves for different hearing aid compression kneepoints are shown compared to a loudness growth function for a normal-hearing listener (solid line) and a hearing-impaired listener (dashed line) (loudness growth curves modified from Pluvinage, 1994). An ambient noise level of 30 dB SPL is shown (vertical dotted line). (A) For the normal-hearing listener, the ambient sound is soft (arrow), whereas for the impaired listener, the sound is inaudible. (B) Input/output curve from a hearing aid with a compression kneepoint of 30 dB SPL. The hearing aid has been fitted to return the impaired listener’s perception of moderately intense sounds to normal levels; ambient sounds are heard as soft (arrow).

*Automatic Volume Controls* Automatic volume controls are advantageous for tinnitus management. When appropriately set, automatic volume adjustment may result in less attention being paid to the aids, ears, and, consequently, tinnitus. Constant volume control manipulation may focus attention to the ears, which will hamper attempts to ignore tinnitus. Volume controls can be useful to
increase amplification in quiet environments, but they are unnecessary if the hearing aid user is able to select different amplification settings for normal and quiet environments through use of a program selector switch or remote control.

*Multiple Programs: The “Tinnitus Program”* Several hearing aid manufacturers promote the use of hearing aids with user-selectable listening programs designed for different listening situations (e.g., background noise or music). These programs attempt to optimize combinations of gain, compression, frequency response, and digital signal processing to suit the listener’s environment. To interfere with tinnitus perception without sacrificing communication, it is often prudent to choose a hearing aid with at least two listening programs. One program can be optimized for communication, and one can be optimized to amplify background sounds. The “tinnitus program” is intended for quiet environments where conventionally amplified ambient sounds would be inaudible or too faint to interfere with the tinnitus. The

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**Figure 12–1 (continued)** (C) With the compression kneepoint set at 50 dB SPL, the ambient sound of 30 dB SPL is very soft. (D) The same as C but with expansion below the compression kneepoint. Expansion below the kneepoint means background sounds are barely audible. By having a low-compression kneepoint, without expansion, greater amplification is provided to low-intensity sounds, making them audible to the hearing-impaired listener. This allows low-intensity environmental sounds to interfere with the detection of tinnitus, without overamplifying louder sounds. CK, compression kneepoint.
A tinnitus program should have many of the features already described as being beneficial for tinnitus management, such as

- A low-compression kneepoint (at or below 40 dB SPL)
- Soft squelch or expansion turned off
- An omnidirectional microphone setting
- Noise reduction algorithms switched off

Figure 12–2  Probe microphone measurements illustrating the effect of a change in compression kneepoint on aided ambient sound levels (compression kneepoint 30 dB SPL: solid line, compression kneepoint 40 dB SPL: dashed line). The ambient sound being amplified was on average 30 dB SPL. The lower compression kneepoint resulted in greater amplification of background sound in the region of the hearing loss. CK, compression kneepoint.

Figure 12–3  Probe microphone measurements illustrating the effect of switching off noise reduction digital signal processing on the amplification of ambient sound (noise reduction off: solid line, noise reduction on: dashed line). Ambient background sounds were more audible with the noise reduction feature disabled.
The principle is to provide as much gain of low-intensity ambient sound as possible without louder sounds causing discomfort. Our rule of thumb in choosing settings for the tinnitus program is to turn off or minimize settings that are promoted as noise reduction features.

*Monaural versus Binaural*  Binaural fittings are advocated in the presence of a hearing loss in both ears. This is done to achieve fairly symmetrical stimulation of the auditory system, to divert attention away from potentially unilateral tinnitus, and to achieve the documented benefits for speech recognition (Ross, 1980). For a unilateral hearing loss, consideration could be given to binaural stimulation with a noise generator for the normal-hearing ear (e.g., hearing aid for right ear, sound generator for left ear). In practice the necessity for such an approach is rare. However, if the hearing aid alone does not interfere with tinnitus detection, a noise generator for the normal-hearing ear can be trialed. Evidence for the long-term merit of binaural versus monaural sound therapy in unilateral tinnitus has yet to be established.

*Summary: Hearing Aid Features for Tinnitus Management*  The hearing aids chosen for tinnitus management should meet the communication needs of the individual. Because of the complex interaction between sound and tinnitus (Feldmann, 1971; Hallam et al, 1984), as well as the loudness sensitivity that often accompanies tinnitus, hearing aids that allow the clinician to alter compression characteristics (compression kneepoint, ratio, maximum power output) and noise reduction features (expansion, noise reduction algorithms, microphone settings) and provide very different settings depending on the listening environment (multiple programs) are recommended.

*Instrument Fitting*

**PHYSICAL COMFORT**  
The physical comfort of the device is evaluated by placing the aid switched off in the ear. Any physical discomfort due to the aid will heighten the patient’s awareness of the ear, focusing attention on the tinnitus. Alterations to the hearing aid shell or mold to ensure that the aid is comfortable, if not a change in style (e.g., completely-in-the-canal to behind-the-ear), are recommended.

**OCCLUSION MEASURES**  
The extent to which the chosen hearing aid prevents transmission of sound by occluding the ear canal is determined using real-ear measurements (Hawkins and Mueller, 1992). A comparison between the real-ear unaided and occluded (aid in but switched off) responses indicates the extent to which the device attenuates sound. If the hearing aid significantly blocks quiet sounds, steps can be taken to overcome this by increasing the vent size or changing the ear mold style. Some occlusion of the ear with the aid switched off is acceptable.
only if the aid switched on can amplify sounds to overcome any insertion loss of ambient sound.

PRESCRIPTION OF HEARING AID AMPLIFICATION

Prescriptive procedures for hearing aid amplification, such as NAL-NL1 (Dillion, 1999) and DSL[i/o] (Cornelisse et al, 1995), have been developed to determine the most appropriate amount of amplification for an individual based on his or her hearing loss. The amount of amplification that best assists hearing speech and that which is optimized to reduce tinnitus audibility in quiet environments is different (Wise, 2003). Also, the amount of amplification normally prescribed by these formulas for high-intensity sounds may exceed the usually low loudness tolerance of tinnitus sufferers.

Hearing Program The hearing aid is adjusted to match real-ear insertion response targets at multiple test levels according to the NAL-NL1 prescriptive procedure. Real-ear probe microphone measurements are undertaken on all aids to verify a good match to prescribed gain. When patients have a history of sound intolerance, it is recommended that uncomfortable loudness levels be measured (Hawkins et al, 1992) rather than being predicted from the audiogram. The hearing aid’s output to high-intensity sound is measured (80–90 dB SPL, swept tones) using the probe microphone system, and the maximum output of the aid is altered where necessary to be below uncomfortable loudness levels.

Tinnitus Program In a second program the aid settings are optimized to amplify ambient sound to partially mask tinnitus. The DSL[i/o] prescriptive target is used as a starting point for the tinnitus program because preliminary evidence indicates that tinnitus is less audible with hearing aids set to this prescription than NAL-NL1 (Wise, 2003). The most likely reason for reduced tinnitus audibility using the DSL[i/o] prescription is that it prescribes greater low-intensity, low-frequency amplification than NAL-NL1 (Dillon, 2001), and most noise is concentrated in the low frequencies (Moreland, 1988).

When undertaking the real-ear measures, the response to a moderate-intensity (65 dB SPL) stimulus (swept tone or composite noise) is matched to the DSL[i/o] aided target, then a quiet background sound (of ~30 dB SPL) is amplified to meet or exceed auditory threshold across as wide a frequency range as possible (Fig. 12–4). The level of sound used is lower than that produced by real-ear measurement equipment; this requires the real-ear equipment signal to be switched off and replaced by a signal external to the equipment. The ambient sound within the clinic room or just audible sound from a hearing aid manufacturer’s environmental sound compact disc can be used as the stimulus to be measured. The amount of amplification finally chosen is usually that which results in the tinnitus being less easily detected without discomfort to the listener. For some patients total masking can be achieved with little amplification of sound. If the degree of ambient sound amplification is unpleasant for the patient, the amount of gain is reduced. Just as with the hearing program, output to high-intensity sound is measured and adjusted so as to be lower than measured uncomfortable listening levels.
Prescription of amplification for tinnitus. (A) DSL[i/o] real-ear aided target (solid line) for an adult with a mild high-frequency sensorineural hearing loss (dB SPL, lower dashed line) and measured uncomfortable loudness levels (dB SPL, upper dashed line). (B) Hearing aid fitted to prescription with the intention of reducing tinnitus audibility. The hearing aid was first adjusted so that output to a moderate intensity stimulus (in this instance, 65 dB SPL composite noise) matched the DSL[i/o] aided target. Ambient sound was amplified to exceed hearing threshold across as wide a frequency range as the hearing aid allowed. Finally, the response to a high-level sound (90 dB SPL swept tone) was measured to ensure that in amplifying soft sounds to audible levels, loud sounds did not exceed measured tolerance levels. The method described is viewed as an easily implemented means to estimate appropriate amplification levels for tinnitus management. The final setting for hearing aid trial would be modified further based on listener preference.
Follow-Up

At each appointment the premise for the fitting of hearing aids is reiterated, and experiences with the hearing aids are discussed. Fine-tuning of the aids is tailored to ensure that they meet the particular patient’s communication needs assisted by the individual’s subjective report in a diary of listening experiences. Once the communication goals have been achieved, the emphasis of tuning changes to reduction of tinnitus audibility. Any adverse response to the hearing aids needs to be addressed so as not to heighten tinnitus focus. Patients are initially encouraged to wear their aids as often as possible, with the intention that they will wear them most of the day once the fitting process has been completed. Depending on their lifestyle, patients may predominantly use the hearing or tinnitus program. Importantly, patients are counseled that both settings are designed to assist in tinnitus reduction. They are instructed to use the hearing program in situations in which communication is likely, and the tinnitus program when in quiet environments. Sources of ambient sound to be amplified are discussed. When in quiet environments patients are encouraged to listen to music, in particular music that evokes positive emotions for the individual. Music that diverts attention and is vigorous is recommended for short-term relief from the tinnitus at its worst, whereas slower pieces of music that enable a progression to a relaxed state may be more helpful in the longer term (Hann, 2003). On occasion a separate hearing aid program may be necessary to enable comfortable amplification of music (Chasin, 2004).

What Should Be Done If Hearing Aids Alone Do not Help the Tinnitus?

Although most patients report immediate benefit in reducing tinnitus annoyance when wearing hearing aids, some do not. Rarely, patients may report an increase in tinnitus, whereas other patients report no change. Possible reasons for such results are discussed here.

Decreased Sound Tolerance

Intolerance to sounds can accompany tinnitus and can create a potential barrier for management using hearing aids. When patients complain that hearing aids exacerbate their tinnitus, it is often found that the maximum output of the hearing aids had been set above the particular patient’s loudness tolerance levels. To accommodate reduced loudness tolerance, extra caution must be applied in selecting appropriate hearing aid settings. In such cases optimal amplification of speech sounds may have to be sacrificed and preference instead given to comfort and amplification of soft sounds. Wide dynamic range compression amplification with low-compression knee points (below 40 dB SPL) and high-compression ratios (1:2 or greater) and low maximum output levels (<100 dB SPL) are chosen. If necessary, gain is reduced across inputs and is gradually increased as sound tolerance permits. As long as the sound intolerance is not severe, management of the tinnitus can occur concurrently. When a patient cannot tolerate any amplification, combination instruments are used. In these cases low-level broadband sound is used initially, as in tinnitus retraining therapy (Jastreboff and Jastreboff, 2000), but the noise is progressively withdrawn and replaced by amplified sounds when change in tolerance levels allow.
Combination Instruments

If patients have moderate to severe hearing loss, combination hearing aids and noise generators (tinnitus instruments) may be more suitable than hearing aids alone. For these hearing losses, the large amount of gain required to make quiet sounds sufficiently loud to partially mask tinnitus may not be possible, or may result in acoustic feedback. In these cases masking noise replaces ambient sound as the best means to reduce tinnitus audibility in quiet. For severe to profound hearing losses, sound therapy of any kind becomes increasingly difficult because amplification of quiet ambient sound to audible levels is unlikely to be achieved, and therapeutic noise may be of insufficient intensity to be heard. Alternatively, the noise level may exceed safety recommendations for intensity and duration of exposure (McFadden, 1982). Some of these patients may be candidates for cochlear implants and receive some tinnitus relief from electrical stimulation (McKerrow et al, 1991; Staller, 1998; Tyler, 1995).

Assistive Listening Devices and Tinnitus

Another relevant consideration is whether or not a patient has a hearing loss. In very quiet environments there may be insufficient background sound to reduce tinnitus audibility. Assistive listening devices such as FM radio aids and infrared and loop systems are employed to enhance the signal-to-noise ratio and/or to amplify sound to connected individuals, sparing others in the room who are not connected. These devices also can be used with tinnitus sufferers to transmit background noise or music directly to the user’s receiving device. This strategy can be very important for those patients who spend most of their day in quiet environments.

Many patients listen to music or background sounds at night when attempting to sleep (see Chapter 9). Music players or bedside maskers are often used, but this sometimes annoys a bed partner. This is helped by pillow speakers, but another option is assistive listening devices (whether or not a hearing loss is present). Some patients have told us they use their hearing aids and assistive devices to achieve a reduction in tinnitus audibility when lying in bed. In this situation they turn off the aid’s microphone to eliminate the feedback that would normally occur when an aided ear is placed on a pillow.

The Future of Research

There has been a relative paucity of research into the use of recent and emerging hearing aid technologies in tinnitus management. The flexibility of current hearing aid technologies may lead to the development of fitting approaches specifically intended for the reduction of tinnitus. Future tinnitus research involving hearing aids needs to be more explicit as to the nature of the devices used and how they were fitted.

Conclusion

- Hearing aids are useful in managing tinnitus when combined with counseling.
- Amplification of speech serves to divert attention away from tinnitus.
Amplification of ambient noise serves to partially mask tinnitus.

The most effective hearing aid settings for communication are not necessarily the best for reducing tinnitus audibility.

It is suggested that multiple program hearing aids are fitted with settings optimized for communication and another optimized for amplification of quiet background sounds.

Fitting the hearing aids using the DSL[i/o] fitting formula is suggested as a starting point for prescribing appropriate amounts of amplification for the partial masking program.

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Tinnitus Sound Therapies

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Acoustic, or sound, therapy is using external sounds to provide relief from tinnitus. Regardless of which devices are used, the rationale for acoustic therapy remains the same: increase the level of external sounds in the patient’s environment to decrease the patient’s perception of tinnitus. In Fig. 13–1 the tinnitus signal is prominent, and the level of background sound (or noise) is low. There is a large tinnitus signal-to-background noise ratio.

One of the goals of acoustic therapy is to increase the level of background sound to decrease the tinnitus signal-to-noise ratio (as shown in Fig. 13–2). Notice that the amplitude of the tinnitus signal has not changed. Background sound has been increased to make tinnitus less noticeable. By analogy, think of bothersome tinnitus as a candle burning in a dark room. The candle flame seems bright. However, when overhead light fixtures are turned on, the same candle flame becomes much less noticeable than it had been in the dark.

This chapter describes techniques and devices that can help patients to increase their exposure to safe and pleasant external sounds to decrease their awareness of tinnitus. This strategy has multiple advantages and benefits:

- Acoustic therapy is noninvasive and has no adverse side effects.
- Patients often obtain immediate relief from their tinnitus.
- Patients can use external sounds to exert some control over their tinnitus. This often results in reduced patient frustration and anxiety.
- Some patients experience residual inhibition: tinnitus suppression or temporary disappearance following exposure to external sounds.
- Acoustic therapy can facilitate patients’ habituation to tinnitus. That is, increasing the level of external sounds within safe limits can help patients learn to pay less attention to their tinnitus. If tinnitus becomes less noticeable, patients will be bothered by it less often.
Increased exposure to external sounds (within safe limits) can increase blood flow to the inner ear (Quirk et al, 1992). This helps to nourish and maintain auditory structures and may contribute to healing processes. Increased exposure to external sounds over time can contribute to reorganizations of neural pathways responsible for tinnitus generation and perception. Altering the pattern of activity within the central auditory system may result in permanent reductions in tinnitus perception.

Acoustic therapy can be a vital component of an effective tinnitus management program. However, to achieve our goal of reducing the severity of each patient’s tinnitus, acoustic therapy should be used in conjunction with other strategies, including:

- Medical evaluations and appropriate interventions
- Patient education
- Counseling/psychotherapy
- Lifestyle changes
- Medications as required

Because each tinnitus patient has a unique health, psychological, and social history, therapeutic interventions should be individualized (Hawthorne et al, 1987; Vesterager, 1997). The most successful tinnitus management programs employ multimodal strategies that are designed to address the specific needs of each patient (Folmer, 2002; Sullivan et al, 1994).
**Acoustic Therapy Strategies**

**Environmental Enrichment**

Tinnitus is usually more noticeable in quiet environments. That is why we play environmental music in the lobby of our clinic while patients are waiting for their appointment. Most patients say that their tinnitus is less bothersome when they are outdoors walking, working, or recreating. Of course, they have to come inside eventually.

We give this recommendation to every patient: Add pleasant sounds to any environment that is too quiet. Some patients have already figured this out for themselves and routinely turn on a radio or television when they are at home. Unfortunately, this is not always possible away from home, especially at the workplace. Another problem with radio or television is the variability of sounds emanating from these devices: music, talk, commercials, and so on. During the day this variety of sounds may provide a welcome distraction from a patient’s tinnitus. However, if patients want to add sounds to the bedroom to improve their sleeping patterns, we recommend more consistent and less distracting sound sources, such as

*Tabletop sound machines*  
Various brands are available that play different types of sounds, such as rain, wind, waterfall, ocean waves, and summer night. Some of these machines also have an input jack for headphones or auxiliary devices such as a pillow speaker.

*Cassette tapes and CDs*  
Many different recordings of nature and environmental sounds (e.g., ocean waves, rainforest, summer night) are available. However,
some patients are distracted by the sounds of bird calls, crickets, or thunderstorms included in the recordings. For these patients, we recommend compact discs with continuous water or masking sounds with no other sound effects added.

Tabletop water fountains Many types are available in a variety of styles and price ranges.

Fans Some patients turn on a fan to help them sleep. However, some people do not like to feel air circulating in the bedroom all night.

Air purifiers Some patients find that the sound of the fan in an air purifier acts as a masking sound for tinnitus.

Insomnia is a common problem among tinnitus patients (Folmer and Griest, 2000). Improvements in sleep patterns are often associated with reductions in tinnitus severity (Folmer, 2002). Before resorting to medications, adding pleasant sounds to the bedroom is a good way to improve sleep patterns. In addition to the sound generators mentioned previously, we recommend the following sound delivery devices:

Pillows with speakers Regular bedroom pillows with speakers embedded inside can be connected to any sound machine, tape, or CD player that has a stereo jack for headphones. Patients can then play any sort of pleasing or comforting sounds to help them sleep. For many people, delivering these sounds close to the ear is more effective than playing sounds through a machine that sits on top of a nightstand or dresser.

Pillow speakers For people who like to use a particular kind of pillow (or none at all), a pillow speaker can be used instead of a pillow with an embedded speaker. These small, flat speakers plug into a sound machine or tape or CD player and deliver sounds near the patient’s ears.

Headband speakers Originally designed for runners and other athletes, a cloth headband with two small speakers sewn inside the band is another option. The headband plugs into a sound machine or tape or CD player and can be worn to bed. For people who also like to wear a mask while they sleep, the front of the headband can be pulled over their eyes.

Headphones and earpieces Some patients wear these devices to bed and plug them into a sound machine (CD or tape player, radio, television, or tabletop sound generator). However, many patients find headphones or earpieces uncomfortable or impractical when they are trying to sleep.

Delivering sound directly into the ear canal is an efficient way to obtain relief from tinnitus. For this reason, we encourage our patients to listen to comforting sounds through headphones or earphones when possible. Two limitations to these devices are the following: (1) Patients’ movements are restricted because they are attached to the sound machine by a cord. Mobility can be increased by using a portable radio or CD or MP3 player. (2) Headphones and earpieces are conspicuous and are impractical for many people to wear, especially in the workplace. For patients who can afford them, in-the-ear devices are the best alternative.
In-the-Ear Devices

SOUND GENERATORS

In-the-ear (ITE) sound generators (sometimes called “maskers”) deliver broadband sound frequencies (typically 100–8000 Hz) and can provide several immediate benefits for tinnitus patients:

- Sound generators can make tinnitus less noticeable by decreasing the tinnitus signal-to-noise ratio.
- Sound generators can muffle the piercing quality of high-pitched tinnitus, making it more tolerable and easier to ignore.
- Sound generators give patients some control over their tinnitus. Part of the frustration for patients comes from the fact that they cannot escape from their tinnitus, and, if they have not yet employed acoustic therapy, they cannot reduce its loudness.
- Sound generators are the most portable and inconspicuous ways for patients to receive this type of acoustic therapy almost anytime, anywhere.
- Because they deliver sound directly into the ear canal, the devices provide effective acoustic therapy using relatively low levels of sound.
- Some patients report improvement in their ability to concentrate (especially when reading) while wearing sound generators.
- Some patients experience residual inhibition (i.e., tinnitus suppression or temporary disappearance following exposure to external sounds) after using sound generators. Even though residual inhibition is usually brief (30–60 seconds), for some patients it is the first time in years their tinnitus has been absent and they are able to experience silence. For a small number of fortunate patients, residual inhibition can last hours, days, or weeks.

In-the-ear sound generators can also contribute to long-term improvements in tinnitus severity:

- Sound generators can facilitate patients’ habituation to tinnitus. That is, they are tools that can help patients learn to pay less attention to their tinnitus.
- The continuous sound exposure provided by these devices can increase blood flow to the inner ear (Quirk et al, 1992). This helps to nourish and maintain auditory structures and may contribute to healing processes.
- Over time, it is possible that continuous sound exposure provided by in-the-ear devices contributes to reductions in neural activity responsible for tinnitus generation and perception.

It is not necessary—sometimes it is not even possible—to completely mask or cover the patient’s tinnitus with sounds generated by in-the-ear devices. Complete masking of tinnitus is a phenomenon that sometimes occurs as a result of acoustic therapy. However, complete masking is not necessarily the goal unless the patient prefers this type of tinnitus relief. For patients who perceive their tinnitus at relatively low sensation levels (SL) (e.g., 0–2 dB SL), almost any sound delivered to their ears completely masks their tinnitus. We let our patients set the level of sound delivered by in-the-ear devices to obtain maximum relief from tinnitus. We instruct patients to set the level of sound generators to a
comfortable, unobtrusive level. We also tell patients not to monitor their sound generators throughout the day. Otherwise, some patients substitute hypervigilance to their tinnitus with hypervigilance to their sound generators. Patients should set the level of sound generators once, then leave them alone and forget about them as much as possible. Sound generators are tools that give patients relief from tinnitus and can help them to pay less attention to tinnitus. We encourage our patients to wear the devices as much as possible during waking hours. Patients sometimes ask the following questions about in-the-ear sound generators.

Q: What if my tinnitus becomes louder? Is it OK to turn up the volume of the sound generators?
A: Yes. Even if most sound generators are turned up all the way, they cannot do physical harm to the auditory system. Most patients do not want or need this level of sound for tinnitus relief. However, they may increase the volume if they so desire. Again, patients should keep the number of volume adjustments per day to a minimum.

Q: What if my tinnitus goes away for a while or becomes so faint that I don't feel the need to wear my sound generators? Should I still wear them? If I don't wear them every day, will the habituation process take longer?
A: If a patient does not want or need to wear sound generators for 1 or more days, that is his or her prerogative. Patients will not necessarily have to use sound generators for the rest of their lives. One of our goals is for patients to eventually be able to ignore their tinnitus most of the time without using any devices. To our knowledge, there is no evidence to indicate that curtailing sound generator use for 1 or more days interferes with the habituation process.

Q: How long will it take for me to habituate to my tinnitus?
A: As long as the patient continues to ask this question, he or she is still monitoring the tinnitus. Some people habituate to tinnitus very quickly. We usually do not see these people in our clinic because their tinnitus is not bothersome and they are not compelled to seek treatment for it. Some patients with bothersome tinnitus seem to believe that habituation is something that will be given to them by a clinician, a device, a medication, or a surgical procedure. In fact, habituation is a set of behaviors that patients must learn to cultivate within themselves. We provide information, tools, and strategies that can facilitate this process. However, patients must take responsibility for their own improvement.

In-the-ear sound generators do not have a good reputation among some clinicians because of the traditionally low success rate and high return rate reported for these devices. Reasons for the low success rate include

- Lack of an integrated, multimodal tinnitus management program. Some clinicians spent a minimal amount of time with each patient, placed sound generators into the patient’s ears, then asked if that was an improvement. This approach has a low likelihood of success.
- Patients were not given the variety of reasons (as described in previous sections of this chapter) for wearing sound generators.
- Complete masking of tinnitus was mistakenly identified as the only goal; when this was not achieved, sound generators were deemed failures.
Patients did not understand how substituting another sound for their tinnitus was supposed to help them. The sounds generated by the devices were described to patients in negative terms, such as “masking noise” and “static.”

To increase the acceptability and perceived benefits of in-the-ear sound generators, we recommend the following:

- Use them as one facet of a multimodal tinnitus management program. In-the-ear devices represent only one type of acoustic therapy. Acoustic therapy is only one component of a comprehensive tinnitus management program.
- If possible, demonstrate in-the-ear devices before patients order them. Give patients time to walk around the clinic while wearing the devices.
- Describe the devices and the sounds they produce in positive terms. For example, if a patient reports that the sound of water running in the shower gives him relief from tinnitus, tell him that the sound generator makes a similar sound. Draw comparisons between the sound produced by the devices and positive experiences with external sounds reported by patients (e.g., with the sound of rain, a waterfall, the ocean, a brook, or the wind). Do not use words such as noise and static because they have negative connotations for many people.
- Thoroughly explain the rationale for recommending a 30-day trial with in-the-ear devices. Explain each of the immediate and long-term reasons for wearing sound generators. Remind patients that complete masking of tinnitus is not always necessary and is not a measure of success.

Criteria for recommending a trial with in-the-ear sound generators:

- Patients with normal or nearly normal hearing who are not candidates for hearing aids
- Otolaryngological exam and clearance by an ear, nose, and throat (ENT) physician
- During the demonstration of these devices, the patient reports that the sound provides some immediate relief from tinnitus
- Patients are interested in using the devices as tools to facilitate improvements in their ability to habituate to tinnitus
- Patients are interested in the possibility of changing patterns of neural activity responsible for tinnitus generation and perception
- Patients with sound hypersensitivity who want to use the devices to desensitize their auditory system

HEARING AIDS

Hearing aids are another form of acoustic therapy that is usually beneficial for tinnitus patients who also have significant hearing loss. Some patients blame their tinnitus for communication difficulties that are actually caused by hearing loss. This is understandable because hearing loss often progresses slowly over time, and people do not always realize what they have been missing. Tinnitus is the addition of an unpleasant perception that sometimes has a sudden onset. Many patients pay more attention to the addition of tinnitus than to their gradual loss of hearing.
It is important for patients to understand the relationship between hearing loss and tinnitus and to appreciate the differences between hearing loss and tinnitus. We stress the following points with our patients:

- Tinnitus does not cause hearing loss, but hearing loss makes it more likely for a person to hear tinnitus.
- Even if the tinnitus stops completely, patients with significant hearing loss will still have communication difficulties.
- Hearing aids do not amplify tinnitus. In fact, hearing aids usually reduce the loudness of tinnitus by amplifying external sounds.
- Hearing aids improve speech perception for patients with significant hearing loss. This should relieve some of the frustration, isolation, and depression experienced by these patients.
- If hearing could be restored to pretinnitus thresholds, many cases of tinnitus would be cured. At the moment, the most practical way to restore hearing is by using hearing aids.
- Hearing aids are beneficial for the brain of patients with significant hearing loss. If these patients do not stimulate as many parts of their auditory system as possible (at safe levels), the neural pathways are more likely to degenerate.
- Using hearing aids to stimulate the auditory system can contribute to permanent reductions in neural activity responsible for tinnitus generation and perception.

Some patients are in denial about the extent of their own hearing loss. That is one of the reasons we encourage spouses, significant others, relatives, or friends to accompany patients during their appointment in our clinic and to participate during the interview session. These companions supply important information that would otherwise be missed. The loved ones can also help us to convince resistant patients about the extent of their communication difficulties and associated problems. Some patients require a great deal of encouragement before they are willing to try hearing aids.

Criteria for recommending a trial period with hearing aids:

- Appropriate hearing loss is determined by audiometric testing.
- An otolaryngological exam and clearance are provided by an ENT physician.
- The patient admits communication difficulties.
- During a demonstration of programmable behind-the-ear (BTEs) in the clinic, the patient reports that hearing aids improve his or her hearing sensitivity or reduce the perception of tinnitus or both.
- The patient is willing to pay for the device and to use it regularly.

Fitting tinnitus patients with hearing aids is similar to fitting any patient with a hearing aid. The following factors should be addressed:

- Circuitry (conventional, programmable, digital)
- Style and size (BTE, ITE, completely-in-the-canal [CIC], etc.)
- Cost
- Care and maintenance
- Follow-up appointments
Programmable hearing aids give audiologists the opportunity to adjust the pattern of amplification for optimal sound processing and tinnitus relief. For this reason, we recommend programmable digital hearing aids for patients who can afford them.

In order for tinnitus patients to receive maximum benefits from hearing aids, the following strategies should be employed:

- All patients should receive education about the relationship between hearing loss and tinnitus. Understanding this relationship and the mechanisms of tinnitus generation helps patients to put the symptom into perspective. Patients are then less likely to blame tinnitus for communication difficulties resulting from hearing loss.
- The nature of each patient’s hearing loss and its effects on communication and socialization should be identified and discussed in detail.
- All patients should be informed about effective communication strategies that are useful for people with significant hearing loss.

Patients receive multiple benefits from hearing aids, including improved sound localization and identification, improved speech understanding, and reduced tinnitus. Many patients who use hearing aids report reductions in feelings of frustration, social isolation, and depression. Improvements in these areas contribute to reductions in tinnitus severity.

COMBINATION INSTRUMENTS

These devices combine two circuits—hearing aid and sound generator—in one wearable unit. Our criteria for recommending a trial period with combination instruments are the same as our criteria for recommending hearing aids, with one addition: if patients already tried hearing aids and experienced some benefits from amplification, but believe they can receive additional tinnitus relief from a sound generator, a trial period with combination instruments is considered.

PATIENTS WITH ONE “DEAD” EAR

Patients with severe to profound hearing loss and tinnitus in the same ear often present a challenge for clinicians attempting to use acoustic therapy. It is difficult to bring external sounds into the “dead” ear to reduce the patient’s perception of tinnitus. Our advice: try everything. Try the most powerful hearing aid available. Even if it does not improve the patient’s speech discrimination, it may provide some relief from tinnitus. Try an in-the-ear (or behind-the-ear) sound generator or a single ear phone attached to a sound machine. If the sound generator does not work in the dead ear, try it in the opposite ear. Some patients receive tinnitus relief from the contralateral ear thanks to crossover pathways in the central auditory system. If the patient’s better ear could benefit from amplification, try a hearing aid or a combination instrument in that ear. If patients are interested in improving their sound localization abilities, they could try a CROS (contralateral routing of signal), BiCROS, or MultiCROS aid. Another option to consider is a bone anchored hearing aid that is implanted on the affected side of the patient’s head.
Other Devices to Improve Hearing

Any devices or procedures (including cochlear implants, brainstem implants, middle ear amplifiers, and prostheses) that improve patients’ ability to hear external sounds have a good chance of making their tinnitus less noticeable. Future innovations in hearing aid technology, auditory prostheses, and surgical techniques will continue to improve the communication abilities of patients who have significant hearing loss. Many of these innovations will also reduce the loudness of tinnitus for patients who experience this symptom as a result of auditory dysfunction.

COCHLEAR IMPLANTS

Patients with severe to profound bilateral hearing loss usually cannot follow our general recommendation for acoustic therapy, that is, using external sounds to obtain relief from tinnitus. Several studies have reported that cochlear implants reduced or suppressed tinnitus for a majority of patients who experienced tinnitus prior to implantation (Brackmann, 1981; Dauman, 2000; Ito, 1997; McKerrow et al, 1991; Souliere et al, 1992; Tyler and Kelsay, 1990). Cochlear implants are therefore a viable option for some patients who experience tinnitus and bilateral hearing loss of this severity.

Patient Expectations

In most cases, we cannot stop chronic tinnitus that is associated with permanent damage to the auditory system. Before patients arrive for their appointment in our clinic, we inform them in writing that we cannot “cure” their tinnitus. We also remind patients of this fact during their initial interview in the clinic. Adjusting patient expectations into the reasonable range is an important step in the process of reducing tinnitus severity and promoting habituation to the symptom. However, as Tyler et al (2001) suggested, it is also important to provide patients with hope. Even though a cure for most cases of chronic tinnitus is not available now, there are many ways for patients to obtain relief from the symptom. For example, patients can learn to use various forms of acoustic therapy to reduce the severity and intrusiveness of tinnitus. Sound therapy remains our preferred and primary mode of tinnitus management.

Follow-Up

Our patients are encouraged to contact us during business hours if they have questions or concerns. Patients who order in-the-ear devices require follow-up appointments for fittings and adjustments. If we do not hear from them first, we call patients 1 month after their initial appointment in our clinic. Follow-up questionnaires are mailed to patients 6 months and 1 year after their initial appointment. Additional questionnaires are sometimes sent to patients years later.

Regardless of which forms of acoustic therapy a patient uses, clinician-initiated contact at regular intervals after the initial appointment accomplishes several important goals:

- To let patients know that we are committed to helping them
- To address patients’ questions or concerns
To check patients’ compliance with our recommendations
To modify recommendations or to suggest different strategies when necessary
To assess the effectiveness of our tinnitus management program

We remind patients that recommendations made to them at the conclusion of their initial appointment in our clinic are starting points. If a patient follows all of our initial recommendations, yet the severity of his or her tinnitus does not improve over the course of 6 months, we either suggest different strategies or ask the patient to return to our clinic for reevaluation and additional counseling. Different devices and tinnitus management strategies can be described or demonstrated during the follow-up appointment. Particular recommendations will then be reinforced or modified.

**Conclusion**

All of our tinnitus patients use acoustic therapy in one form or another. Because sound enrichment is just one component of our multimodal tinnitus management program, it is impossible to determine the effectiveness of acoustic therapy alone. However, teaching patients how to use external sounds to reduce their perception of chronic tinnitus usually helps to reduce the severity of their condition.

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In this chapter, we describe and provide the rationale for each major step of our tinnitus treatment process, including clinical materials and treatment strategies.

The primary goal of our tinnitus treatment program is to equip our patients with the necessary knowledge and tools to promote tinnitus relief by helping them overcome the psychosocial (e.g., depression, concentration difficulty, inability to participate in work and leisure activities) and physical (e.g., sleep deprivation, muscle tension) consequences of tinnitus. Because tinnitus can affect multiple systems (e.g., emotions, physical behaviors), a multidisciplinary team approach is used. Our core team consists of audiologists, otolaryngologists, and psychologists who have a special interest in the treatment of tinnitus. In addition, specialists from other clinical areas, such as a sleep laboratory or pain clinic, may be involved, depending on the individual patient’s needs.

It is important to note that, although we follow several principles of established tinnitus treatment protocols, we do not adhere entirely to one specific management approach. Philosophies from several different disciplines that use a variety of management techniques, including sound therapy, relaxation therapy, biofeedback, and cognitive-behavioral therapy, are incorporated.

Moreover, and somewhat uniquely, clinical services are offered using both group and individual patient contact formats. Including an initial group session prior to individual sessions has added a different, and positive, dimension. There are many advantages for holding group sessions. (The reader is referred to other sources such as Jacobs et al, 1988, and Corey, 1995, for more information on the virtues of group therapy.) Briefly, from the clinician’s viewpoint, conducting group sessions is very cost and time efficient. That is, the same information can be provided to more patients in less time, maximizing available resources. From the patient’s viewpoint, the group experience allows the individual to realize
that he or she is not alone, that others suffer from tinnitus as well. The group situ-
ation promotes a safe and supportive environment to share experiences with tin-
nitus and how to cope—or not cope—with the handicapping nature of the tinnitus. Yet an inherent disadvantage of the group setting is the lack of the opportu-
nity to develop the empathic counselor–patient relationship, the one-on-one relationship. It is more efficient to focus on a patient’s specific issues in individual sessions. Therefore, our model for treating tinnitus incorporates both group and individual sessions.

The following sections describe the steps—or visits—in the treatment process. It is important to note, however, that depending on tinnitus severity, it may not be necessary for each patient to participate in all four steps. Therefore, the sequence of visits was developed specifically to assess, diagnose, and treat patients with a wide range of tinnitus severity requiring different levels of management.

**Step 1: Initial Diagnostic Evaluations**

**Audiological Assessment**

The first step in the treatment process is to obtain a comprehensive audiological evaluation, including pure-tone and speech audiometry, immittance measure-
ments, and otoacoustic emissions. The audiological evaluation serves three main purposes.

1. The results assist the otolaryngologist in the medical diagnosis of ear disease that may be underlying the tinnitus symptom.
2. Key questions asked during the initial case history (Fig. 14–1) allow the audiologist to assess the severity of the tinnitus and determine if the patient needs to be referred to step 2.
3. Audiological data provide the basis for determining which form of sound therapy should be incorporated in the treatment plan. For example, a patient with a hearing loss may benefit from the use of hearing aids or combination units (hearing aid plus sound generator together in same unit), whereas, an individual with normal hearing may benefit from sound generators alone.

Following the audiological evaluation, patients who are determined to be candidates for step 2 are given a brochure that outlines each step in the management process. Most importantly, patients are counseled strongly about the importance of completing the otolaryngology evaluation and follow-up consultation prior to beginning rehabilitative management.

**Medical Assessment**

Medical clearance assures the audiologist that there is no underlying pathology that should be addressed prior to the provision of rehabilitative tinnitus manage-
ment and alleviates the fear held by many patients that they have a serious health condition. Accordingly, the medical evaluation serves both a diagnostic and a therapeutic purpose. It is important that the physician does not provide “negative counseling” to the patient by saying, “Learn to live with it.” Clearly, the physician’s role needs to be positive about the benefits of rehabilitative treatment
and to provide reassurance that there is help. This sets the stage for successful management by the audiologist and psychologist on the team.

**Step 2: Group Education Session**

All patients desiring to continue with treatment are scheduled for the group education session. The group format was selected because it is an efficient method of providing informational counseling in a busy clinical practice.

According to Jacobs et al (1988), there are seven different types of groups that are based on their inherent goals: mutual sharing or support groups, discussion groups, task groups, encounter groups, therapy groups, family groups, and education groups. The goal of step 2 is to provide education or informational counseling to a larger number of persons to optimize time and cost efficiency. The optimal size for an education group is up to 12 members (Jacobs et al, 1988). In our group, no more than 8 patients are scheduled per session. Significant others are encouraged to attend and participate. With attrition, the typical size of our groups is 8 to 10 individuals, including significant others. We have found this number of participants to be a very workable size group. It is important to control the group size because too large or too small of a group will inhibit individual participation and reduce opportunities for interaction.

The recommended session length for group therapy is 1 1/2 to 3 hours. Our session is approximately 1 1/2 hours in length—sometimes longer or shorter, depending on the amount of individual participation.

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**Tinnitus Case History Questions**

1. Does your tinnitus affect your everyday life? If so, how?
2. Does your tinnitus keep you from falling asleep or wake you during the night?
3. Does your tinnitus interfere in your ability to communicate with others?
4. Can you describe your tinnitus: pitch, tonal characteristics, location, occurrence?
5. How long have you been bothered by your tinnitus?
6. What do you think caused your tinnitus?
7. Does anything make your tinnitus less bothersome? More bothersome?
8. If there is a hearing loss: Which is more bothersome to you, your hearing loss or your tinnitus?

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**Figure 14-1** Examples of key questions to ask about tinnitus when creating a patient’s case history.
It is very important that confidentiality and privacy be maintained as much as possible during the group. Therefore, we begin each group session warning that information shared in the session is not to be taken out of the room. In addition, each patient signs a shared appointment form (described later).

The information presented in the session is geared toward increasing patients’ understanding of tinnitus and knowledge about management strategies. Although patients are encouraged to share their experiences about their tinnitus, the session needs to be controlled so that individual participants do not use the group as a “sounding board” for their problems. It is critical to the success of the group that each participant understands this important ground rule and that the clinician has the skills to maintain appropriate group dynamics.

The general goals of the group education session are to:

- Clarify misconceptions (e.g., “Will I go deaf because of my tinnitus?”)
- Provide reassurance
- Offer practical suggestions and techniques that provide many patients with immediate relief
- Empower the patient to take control of the tinnitus rather than being controlled by the tinnitus
- Demystify tinnitus by providing an understanding of the mechanisms underlying tinnitus and the rationale for tinnitus relief strategies
- Establish trust and rapport between clinician and patient that will promote compliance with further recommendations
- Provide hope for tinnitus relief

So that patients understand what to expect during the step 2 appointment, a packet of information is sent to them approximately 2 weeks prior to the appointment date. It is important that they realize that this appointment will occur in a group setting, not a one-on-one appointment. Therefore, information explaining the advantages of the group session is provided. It is also important that they realize that the fee for the appointment may not be covered by insurance. The packet of information contains the following items:

- **Appointment confirmation letter.** This letter briefly summarizes the overall philosophy of the Tinnitus Management Clinic, reminds the patient that he or she must have received medical clearance prior to the group education session, provides a brief outline of the topics to be discussed during the group session, and confirms the date, time, and location of the appointment. Further, patients are informed that there is a fee for the session that is not typically covered by insurance carriers.
- **Tinnitus Management Clinic overview fact sheet.** This informational piece describes the clinical services provided at each step in the management process along with information about fees.
- **Tinnitus Handicap Inventory (THI; Newman et al, 1996).** Patients are requested to complete the THI at home prior to the visit. The results of this questionnaire not only assist us in determining the severity of the perceived handicap and serve as a baseline for evaluating future treatment outcome but also allow the patient to realize the extent that the tinnitus affects his or her daily life. That is, a patient indicating minimal handicap on this questionnaire may realize that he or she is indeed coping with the tinnitus and may
not need to proceed to the next treatment step. A patient indicating significant handicap may be more motivated to pursue further treatment.

- **Shared medical visit waiver.** The use of group sessions naturally violates confidentiality; therefore, patients and any significant others are required to sign this waiver. By signing the form, patients agree that “the Cleveland Clinic Foundation shall not be liable for any financial or other damages resulting from any breach of confidentiality committed by other members of the group.” Furthermore, patients agree “to protect each other’s privacy by not identifying other patients or discussing their health problems outside of the group setting.”

Following check-in, signing of the waiver, and taking care of the financial component, patients are provided a packet of information and escorted to the conference room. The packet of information includes the following:

- A copy of the book Tinnitus: Questions and Answers (Vernon and Tabachnick Sanders, 2001)
- Information about different forms of sound therapy
- An order form for relaxation tapes developed by the Cleveland Clinic Department of Health Psychology and Applied Physiology (available from The Cleveland Clinic/P57, 9500 Euclid Avenue, Cleveland, OH 44195-5189)
- Handouts providing information and Web site addresses for tabletop sound generators (e.g., www.marpac.com), tinnitus relief compact discs (e.g., www.tinnitushelp.com), and other assistive devices (e.g., www.soundpillow.com)
- A membership form for the American Tinnitus Association

The group education session is conducted in a small conference room. All patients and accompanying persons are seated around an oblong conference table. This setting is very informal and promotes good clinician–patient and patient–patient interaction. At the beginning of each session, patients are asked to introduce themselves by first name and provide a brief description of their tinnitus (e.g., When did it start? Where is the tinnitus located? What does their tinnitus sound like?). Following the introductions, the more formal segment of the counseling begins.

The topics addressed in the group education session were selected carefully to be appropriate for a broad range of tinnitus severity. Following is a list of the major topics covered during the group visit.

- Tinnitus definitions
- Epidemiology of tinnitus
- Normal and abnormal anatomy and physiology of the auditory system
- Common reactions to tinnitus
- Overview of treatment options, including sound therapy, cognitive-behavioral therapy, stress management, biofeedback, and relaxation therapy
- Clarification of the remaining steps comprising the treatment we offer

A picture-based presentation using a slide show is used to guide the flow of the discussion. The specific information regarding each of the topics is conveyed using a series of animated picture sequences and sound clips.
At the conclusion of the group education session, the information in the packet provided is reviewed. For many patients, their treatment will end with the conclusion of step 2. Other patients may need to progress to the next steps; therefore, the procedure to schedule the next appointment, step 3, is reviewed. It is important to note that, at this point, continued enrollment is entirely self-selective. That is, it is the responsibility of the patient to decide if further treatment is necessary. Accordingly, the group education session is a process of natural separation for those patients only in need of informational counseling from those who require further evaluation and more intensive individual treatment.

**Step 3: Individual Tinnitus Evaluations**

Step 3 is initiated when the patient calls to schedule the individual tinnitus evaluation. In response to that call, a set of questionnaires is mailed to the patient along with a return self-addressed stamped envelope. When the completed questionnaires are returned, the appointment is scheduled. The questionnaires serve to assess further the characteristics of the tinnitus (Iowa Tinnitus Questionnaire, Stouffer and Tyler, 1990), assess the urgency for scheduling the psychologic treatment component (Beck Anxiety Inventory, Beck et al, 1997; Beck Depression Inventory—FastScreen for Medical Patient, Beck et al, 1997) and provide the psychologist with information necessary for development of appropriate intervention (Millon Clinical Multiaxial Inventory III, Millon, 1994; Symptom Checklist-90-R, Derogatis, 1977). Each of the aforementioned measures is described briefly in Table 14–1.

The individual tinnitus evaluation phase consists of two major appointments; namely, the individual audiological tinnitus evaluation, conducted in the Section of Audiology, and the individual tinnitus behavioral health assessment, conducted in the Department of Health Psychology and Applied Physiology. If possible, the appointments are scheduled on the same day for patient convenience. The following sections will briefly describe each appointment.

**Individual Audiological Tinnitus Evaluation**

The individual audiological tinnitus evaluation is a 1\frac{1}{2}-hour appointment. Tinnitus is evaluated following the World Health Organization (WHO, 1980, 2002) classification scheme for describing the consequences of health conditions (see Table 14–2), as suggested by Tyler (2000). Table 14–2 illustrates the assessment tools used for each domain in the WHO classification scheme. The impairment measures are helpful not only to reassure the patient that the tinnitus is real but also to demonstrate to the significant others what the patient is experiencing (Tyler, 2000). The impairment, disability, and handicap outcome serve as baseline measures against which to assess treatment effectiveness. Furthermore, by conducting an item analysis of the questionnaires, specific problems encountered by the patient may be identified and addressed.

The second component of the individual audiological tinnitus evaluation is the determination of the appropriate sound therapy. All patients are counseled about the importance of maintaining a “sound-enriched” environment and the variety of methods available for maintaining a low-level of background sound. These include the use of tabletop sound generators, special compact disc recordings...
designed to provide tinnitus relief (e.g., Petroff Audio Technologies DMT-6a Dynamic Tinnitus Mitigation, Palmdale, CA), and/or music. Each of the aforementioned sound generation techniques is demonstrated, along with a discussion of benefits and limitations.

In addition to the use of nonwearable devices already described, many patients are fit with wearable instrumentation, including ear-level maskers/sound generators, hearing aids, or combination units. Clinic-stock maskers/sound generators are evaluated on the patient in the clinical setting so that they can experience the relief generated by the presence of broadband noise. If the patient has a

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### TABLE 14–1 Summary of the Questionnaires to Be Completed by the Patient Prior to Scheduling the Individual Evaluation Appointments

<table>
<thead>
<tr>
<th>Questionnaire</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Iowa Tinnitus Questionnaire.</strong> The Iowa Tinnitus Questionnaire (Stouffer and Tyler, 1990)</td>
<td>is a 31-item case history form assessing several tinnitus characteristics, including location, tinnitus variability, quality, exacerbating and reducing factors, dysfunctional thoughts, and medication use. In addition, the questionnaire incorporates magnitude estimation rating scales for tinnitus pitch and loudness, annoyance, sleep disturbance, depression, concentration difficulty, and speech interference.</td>
</tr>
<tr>
<td><strong>The Beck Anxiety Inventory (BAI).</strong> This scale is comprised of 21 items evaluating subjective, somatic, and panic-related symptoms of anxiety. The patient is asked to rate how much he or she has been bothered by each of the symptoms (not tinnitus related) listed over the past week on a 4-point (0–3) scale. The items are summed to obtain a total score ranging from 0 to 63 points, with higher scores reflecting greater anxiety.</td>
<td></td>
</tr>
<tr>
<td><strong>Beck Depression Inventory—FastScreen for Medical Patient.</strong> This 7-item scale reflects the cognitive and affective symptoms of depression and is a quick and effective way to screen for depression. For each item the patient is asked to read a group of statements about a single dimension of depression (e.g., pessimism) and to pick out the one statement that best describes how he or she has felt over the past 2 weeks. For example, the responses to the pessimism item include the following statements: I am not discouraged about my future (0 points); I feel more discouraged about my future than I used to be (1 point); I do not expect things to work out for me (2 points); I feel that my future is hopeless and will only get worse (3 points). Scores range from 0 to 21 points, with higher scores reflecting greater perceived depression.</td>
<td></td>
</tr>
<tr>
<td><strong>The Millon Clinical Multiaxial Inventory-III (MCMI-III).</strong> This self-report instrument is composed of 175 true/false items used to identify personality characteristics underlying a patient’s present symptoms and to help guide treatment decisions by providing an integrated picture of personality characteristics. The MCMI-III includes 14 personality pattern scales that coordinate with the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) axis II disorders (e.g., depressive, compulsive, negativistic) and 10 clinical syndrome scales related to DSM-IV axis I disorders (e.g., anxiety, somatoform, post-traumatic stress disorder).</td>
<td></td>
</tr>
<tr>
<td><strong>The Symptom Checklist-90-R (SCL-90-R).</strong> This is a multidimensional self-report inventory designed to screen for a broad range of psychological problems and symptoms of psychopathology and can be used as a measure of treatment progress. The SCL-90-R contains 90 items and can be completed within 12 to 15 minutes. Each of the items is rated on a 5-point scale of distress (0–4) ranging from “not at all” to “extremely.” The scale measures nine primary symptom dimensions (e.g., somatization, hostility, anxiety). There are also three global indices as well: global severity index—designed to measure overall psychological distress; positive symptom distress index—designed to measure the intensity of symptoms; and positive symptom total—reporting the number of self-reported symptoms.</td>
<td></td>
</tr>
</tbody>
</table>
TABLE 14–2 The World Health Organization Categories for Describing the Consequences of Health Conditions and the Tools to Assess Those Consequences for Our Tinnitus Evaluation Model

<table>
<thead>
<tr>
<th>Impairment</th>
<th>Disability/activity limitation</th>
<th>Handicap/participation restriction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dysfunction of auditory system resulting in perception of tinnitus</td>
<td>Reduced abilities of an individual to function in a normal manner as a consequence of the tinnitus impairment</td>
<td>The psychosocial manifestations of impairment and disability that result in the need for extra effort and reduced independence</td>
</tr>
</tbody>
</table>

Assessment tools used in our clinic

- Psychoacoustic measures:
  - Pitch matching
  - Loudness matching
  - Minimum masking levels
  - Residual inhibition
  - Loudness discomfort levels
  - Magnitude estimation:
    - Pitch estimation
    - Loudness estimation

- Iowa Tinnitus Questionnaire
- Beck Depression Inventory
- Beck Anxiety Inventory
- Tinnitus Handicap Inventory

References

- Stouffer and Tyler (1990)

Concomitant hearing loss, the use of a hearing aid alone or a combination unit may be recommended. Determination of the specific device will be based on the results of the audiological and tinnitus evaluation. One tool that has been helpful in determining whether to recommend hearing aids alone or the combination units is the Hearing Handicap Inventory for the Elderly/Adults (HHIE, Ventry and Weinstein, 1982; HHIA, Newman et al, 1990). For example, if the hearing loss has little to no impact on the patient’s psychosocial and communication function (e.g., ≤18 out of 100 points on the HHIE/A), the use of sound generators alone may be indicated. In contrast, if the hearing loss poses significant handicap (>18 points), the use of hearing aids or combination units may be warranted.

At the conclusion of the visit, ear mold impressions are taken. The devices are then ordered, and the follow-up appointment is scheduled. The results of the evaluation are documented on a standardized form, allowing a report to be generated within minutes. This report is divided into five main sections: (1) description
of the tinnitus, (2) self-report measures results plotted against normative data, (3) summary of the psychoacoustic testing, (4) counseling provided to the patient, and (5) recommendations. Note: The form was designed to include all the tests that we could administer during the assessment appointment; however, in practice, not all tests are administered for each patient. Only those tests completed are recorded.

**Individual Tinnitus Behavioral Health Assessment**

The psychologist initially conducts a traditional evaluation that includes the psychometric assessment measures described in Table 14–1, the patient’s perspective of his or her tinnitus, a clinical interview, and gathering of personal history. An important part of this evaluation is the process of placing the current tinnitus complaint in the context of any history of psychological distress. Because the appearance of tinnitus symptoms does not take place in a social vacuum, family and relationship information is examined and is quite valuable in eliciting the overall psychosocial context of the patient’s symptomatology.

**Step 4: Individual Treatment and Follow-Up**

**Audiological Management**

Patients requiring fitting of devices are seen approximately 2 weeks after the individual audiological evaluation for the fitting of those devices. Because we do not adhere strictly to one specific sound therapy technique for all patients, an individual treatment plan using different levels of sound therapy is devised for each patient based on his or her particular needs. For example, if a patient requires immediate relief from the tinnitus, complete masking is used during the initial treatment phase. That is, a patient with a score on the Tinnitus Handicap Inventory of ≥58 (out of 100 points) may be able to gain some immediate control over the tinnitus and maintain his or her ability to function more normally in everyday life when complete masking is used at the outset. The relief provided by the masking promotes a reduction in stress, which, in our experience, helps to reduce the perception of the tinnitus. Plus, the immediate relief provided by the masking sound gives the patient a sense of hope. Following a short-term period of complete masking (typically 1 month), the patient is “transitioned” into a more long-term management approach using concepts borrowed from the habituation model (Hallam et al, 1984). In terms of the sound therapy regimen, patients are instructed to no longer “cover up” the tinnitus (complete masking) but to set the devices to deliver the sound at a level slightly below the tinnitus (partial masking), facilitating tinnitus habituation. The complete masking phase is only recommended for patients requiring immediate relief. For all other patients, partial masking is the recommended initial phase for sound therapy.

Following the provision of sound generators, hearing aids, or combination units, all patients are scheduled for follow-up appointments at 3 weeks and 3 months. After that, patients are contacted by telephone or e-mail (patient preference) at 6, 12, and 18 months to address questions or concerns. If necessary, patients may return for a face-to-face visit with the audiologist at any time. To monitor progress, the THI is mailed to the patient with a self-addressed envelope at the aforementioned time periods.
Psychological Intervention

Educating the patient in the mind–body connection is a major focus of intervention used by the psychologist. Most patients will readily admit that stress in general, and specifically negative emotions, will exacerbate the intensity of tinnitus. For some, tinnitus symptoms can be triggered by major situational or emotional stress factors that have occurred in their life. The main complaints that patients will attribute to tinnitus during psychological intervention include interference with the onset of sleep, the realization of “no quick cure,” the difficulties of adjusting to having a chronic physical symptom, and the inability to relax secondary to attentional focus on internal tinnitus stimuli.

The most frequent approach used to modify errors in logic and dysfunctional thoughts about tinnitus is cognitive-behavioral therapy. This approach focuses on identifying the connection between thoughts and tinnitus symptoms as well as behavioral factors that may influence the course of tinnitus. The goal of cognitive-behavioral therapy is to reduce depressive self-talk and to reduce unhealthy behavioral risk factors. An example of depressive self-statements is “This isn’t fair. I can’t take this anymore. Why did this happen to me?” An example of unhealthy behavioral risk factors is the intake of high levels of caffeine or tobacco abuse, along with substance abuse. Our belief is that cognitive-behavioral therapy coupled with sound therapy provides a beneficial approach for most patients. That is, any management attempt with sound therapy will be more successful if it is used in conjunction with cognitive-behavioral therapy. In combination, the cognitive-behavioral therapy helps to control the illogical thoughts about tinnitus held by many patients, thereby facilitating habituation.

In addition, we have found that biofeedback and relaxation therapy are effective. Stress is often accompanied by muscle tension, especially tight facial musculature—an example of a frequently occurring mind–body symptom. When this occurs, biofeedback and relaxation therapy would be most beneficial to reduce that muscle tension and, ultimately, the stress.

Utilizing social support is another important psychological treatment intervention in dealing with any type of physical symptom. In the case of tinnitus, social support by family members or significant others often requires education as to the nature of hearing disturbance in general, and tinnitus in particular. The invisibility of tinnitus also makes it difficult for social support networks to understand the degree of interference and distress that can be caused by tinnitus. Therefore, tapes, CD, or computer sound files that simulate tinnitus are often helpful in conveying the annoyance of the tinnitus.

Psychological treatment, although initially viewed with apprehension and reluctance, has been quite effective for our patients with severe self-perceived tinnitus handicap. It is a required component of our treatment for patients to be seen, at least once, by the Department of Health Psychology and Applied Physiology.

Conclusion

Our protocol was designed to provide evaluation and treatment for patients with a broad range of tinnitus severity. Members of the multidisciplinary team offer a variety of strategies to help individuals gain control over their tinnitus and to ultimately improve their quality of life. One unique feature is the group education
session. This format offers a cost-effective method for providing important information to tinnitus sufferers. The combination of sound therapy techniques coupled with psychological interventions, including biofeedback, stress reduction, and cognitive-behavioral therapy, has been useful in helping our patients learn to manage their tinnitus.

In this connection, we hope to (1) move tinnitus sufferers from a state of intolerance to a state of tolerance, thereby allowing them to participate in everyday life activities without the constant intrusiveness of the tinnitus; and (2) have patients reach a state where the tinnitus sensation is regarded as a neutral signal rather than one that is disruptive to their lifestyle.

Acknowledgment

We would like to thank Jerome Kiffer for his input regarding the psychological evaluation and treatment section of this chapter and for his continued support of our patients with tinnitus.

References

Beck AT, Guth D, Steer RA, Ball R. Screening for major depression disorders in medical inpatients with the Beck Depression Inventory for Primary Care. Behav Res Therapy 1997;35:785–791
Tinnitus can be a most intruding and disturbing experience. Fortunately, most persons become accustomed to it. A small percentage of individuals, however, are continuously and severely bothered by the sound influencing all aspects of their life. Through our psychological work with persons suffering from tinnitus, we have found that sometimes this suffering coexists with other “whole life” personal problems or factors enhancing the annoying influence of the tinnitus. It is difficult to help such patients in the traditional way (i.e., informational counseling and sound therapy). They do not have a psychiatric disorder that can explain the suffering (depression, anxiety disorder).

This protocol is founded on the point of view that for such persons, tinnitus has to be understood as providing important information about the way the person approaches the problems, challenges, and dilemmas in his or her life. The person has to clarify the relevance of this information and then, if possible, take a stand on it. This, however, demands that the focus of treatment is displaced from tinnitus alone to the person as a whole; that is, the person’s relation to himself or herself (including tinnitus) and to others: family life, social life, work life; the individual’s spiritual life, including thoughts of life being time limited; value system: social norms, norms of behavior, moral standards, and ethics. In other words, in these cases as much information as possible has to be obtained about the person to clarify whether there exists a connection between the suffering from tinnitus and the way the person with tinnitus approaches life.

It is our experience that the framework of existential therapies, which center around the person and how they relate to all aspects of life, has particular relevance to the treatment of tinnitus. Existential therapy is “a rich tapestry of intersecting therapeutic practices, all of which orientate themselves around a
shared concern: human lived existence”. (Walsh and McElwain, 2002:254, in Cooper, 2004). In this chapter, we explain our own specific application of existential psychotherapies to tinnitus patients, which we refer to as “Tinnitus Person-Centered Therapy.”

The therapist using the framework of the tinnitus person-centered therapy will work in the direction of encouraging the person to examine whether a meaningful perspective could be attached to tinnitus rather than trying to teach the client principles of attention, habituation, or coping strategies. Hence the objectives of therapy will be to support the client to understand, learn from, and integrate tinnitus into his or her life. The person owns the tinnitus instead of being owned (victimized) by it.

The aim of this protocol is to introduce some of the concepts from the framework of the existential therapies that we find useful in our work with clients suffering from tinnitus as well as to outline our method of gathering overall oriented information about the client. We also provide an example of how we work using the framework of person-centered therapies.

Who Can Benefit from Person-Centered Therapy?

Many people let their life be conducted by attitudes, assumptions, demands, and expectations (to themselves as well as to their surroundings), standards (of society) that they unknowingly have applied to life. These elements work like a kind of underlying demanding automatic operating system, bossing the client around and making him or her work very hard in all aspects of life. Such dutiful people often use expressions like “one should,” “one ought to,” “one has to,” and “nothing one can do about it.” An example is the mother dragging herself through watching all the games that her son is playing because she thinks that this is “how a good mother is supposed to be.” Another is the homemaker who wants things done in her own way working very hard every day to satisfy what she believes is the needs of the rest of the household. She is demanding that her husband support her and feels very angry or disappointed when he doesn’t notice all her work or doesn’t help her the way she wants him to. Often this leads to problems between the husband and wife. Another example is the boss who is the first to arrive at the office in the morning and the last one to leave in the evening because he thinks that is how “one sets a good example to the employees.” Such people may seem active and engaged, but their way of living often makes them feel very stressed. However, they actually are exerting a kind of passiveness toward life. They do what they always have done without ever challenging these automatic ways of being by, for instance, posing this question: Might there be other and more rewarding ways of being in life?

At some point in the client’s busy life tinnitus either starts or is enhanced. The client becomes scared or even terrified. In his or her search for the tinnitus cure, a new career begins: the one of becoming a helpless and help-seeking patient suffering from tinnitus. The problem is that nothing really helps and that tinnitus just continues ringing or buzzing. Therefore, the client feels stuck. Depression may develop. Hence tinnitus is felt to be a powerful enemy that hinders the client in coming back to living the familiar life.
What the client disregards or perhaps only vaguely senses is that the demands of the underlying self-imposed automatic system simply have exceeded his or her ability to continuously fulfill them. As a consequence, one way to understand the impact of tinnitus is that it is a warning signal telling the client that the way he or she lives is too exhausting and stressful (assuming that such a person enters therapy, we now use the term client), that it may even be dangerous to go on living the way the person does, and that new ways of being in life have to be discovered.

Elisabeth is a 24-year-old anthropology student. She lives at a dormitory in Copenhagen but is often staying at her parents' house in the countryside, enjoying their company as well as the wonderful surroundings of nature. She has a good and close relationship with her parents. She doesn’t have a boyfriend because the studies are taking up almost all her time. She has had tinnitus since age 16 (due to fireworks). After some difficulties she is making an effort to learn to live with it. For some unknown reason tinnitus now has worsened. Nothing has been found that can explain this aggravation. However Elisabeth is very influenced by her new situation. She is unable to study. She divides the days into good days (when tinnitus is not annoying) and bad days (when tinnitus is annoying and disturbing). Presently she mostly experiences bad days. On these days she goes to her parent’s house, lies in her old bed, crying. The parents are very concerned, trying to support and comfort her.

The Integrating Concepts in Person-Centered Therapy

When working in the framework of the existential therapies, therapy is understood as a humane meeting between two persons talking about the personal situation of one of them with a special reference to his or her problems, dilemmas, and potential choices (Jacobsen, 1998). The therapist is providing a warm, honest, and respectful relationship to the client, thus establishing a relationship of trust. While at the same time validating and respecting the client’s experience and way of living his or her life, the client is encouraged to investigate/study that life: choices, attitudes, assumptions, relations to himself or herself, symptoms like tinnitus, and other issues.

The overall objective of existential therapies is to help clients become more authentic (“writings of their own life”; van Deurzen, 1997, 2002). This includes becoming aware of their actual existence and to live more in accordance with their true values, beliefs, and experiences—in the context of given possibilities and limitations (Cooper, 2004; van Deurzen, 1997, 2002).

During the therapeutic process, the person-centered therapist’s work continuously shifts between

1. Entering the client’s world, thus being in the position of being-with-the-client
2. Exiting the client’s world, thus being in the position of being-for-the-client

When being-with-the-client, the therapist, together with the client, is a co-student of the way the client exists in life. The therapist tries “entering the world” of the client, thus, metaphorically speaking, being under the client’s skin and looking through his or her eyes at the client’s lived world. The therapist is naive in a disciplined way (Yalom, 1980) and brackets all his or her professionalism and knowledge as well as assumptions and prejudices—whatever the client says or utters is new to the therapist and has to be clarified, whenever needed.
The aim of the therapist is to grasp the experience of being the client as fully as possible.

When being-for-the-client, the therapist’s position is one of being a human being meeting with another human being. In this position the therapist’s educational background as a psychologist also is present as well as the therapist’s own experiences and thoughts on the given theme or topic. During the therapeutic process, the existential working therapist shifts between blank slate and being genuine and direct (in a gentle way). The method of the therapist being a “blank slate” is used in other therapeutic directions, making the therapist as neutral as possible. The therapist often starts off by mirroring back what he or she so far has grasped from the study of the client’s life:

**Elisabeth:** The best place for me to be on my bad days is at my parent’s house. Here I can be myself.

**Therapist:** So being at your parent’s house allows you to be yourself with your suffering.

This process of mirroring is exerted to ensure that the therapist really has grasped what it is about, or to make the client really listen to and wonder about what the client actually has just said. Sometimes having repeated/mirrored what has been said makes the client examine further whether he or she really means what was actually just uttered. This mirroring can lead to new thoughts or comments from the client that need further clarification (back to step 1), or the mirroring can be followed by an attempt from the therapist to shed light on what may be a different or new, but hopefully more constructive, way of looking at the problem experienced by the client (which would be too early in the present example). Alternatively, the therapist may encourage the client to take a stand on the theme; that is, discuss or give back to the client the therapist’s own thoughts on the theme.

The most important tool that we use to investigate the lived experience of the client as thoroughly as possible is the phenomenological method of investigation (Spinelli, 2000). This method is composed of three rules:

1. **Bracketing.** The therapist continuously brackets all his or her “initial biases and prejudices of things, suspending his [or her] expectations and assumptions” (Spinelli, 1989) to be as open-minded as possible toward whatever the client may bring instead of immediately judging, taking a stand on, giving professional advice, or interpreting the client’s experience. The aim is to make the therapist able to grasp as clearly as possible what the client is experiencing—to see and feel what the client is feeling. This rule is very difficult to observe. Assumptions, theories, and knowledge will keep intruding. Just stop for a while and try to reconstruct your own thoughts (assumptions) when reading this sentence from the case study: “The best place for me to be on my bad days is at my parent’s house. Here I can be myself.” Now try to bracket your assumptions. Which questions would you pose to clarify the client’s intent further? The difficult challenge for the professional wanting to use the phenomenological method of investigation is to be aware of all assumptions while trying to grasp the world of the client.
2. **Description.** The second rule can be summarized as “Describe, don’t explain” (Spinelli, 2000). Instead of discussing, for instance, what clients have read or heard of the physiology of tinnitus, they are encouraged to describe all the different situations in which tinnitus is annoying them, how it annoys them, and how they then react. This rule can be very difficult to keep. Basically, it is about listening while keeping clients on the right track of describing, thus guiding them away from their own attempts at speculation and assumption. If you are interested in trying out this rule, ask someone to describe a headache and how it influenced that person’s day. Your role is only to ask questions elucidating details that will keep the person on topic. Only pose questions when needed, otherwise keep silent while nodding in a confirmative way, thus encouraging the person to speak.

3. **Horizontalization.** The rule of horizontalization is meant to help the therapist not “making immediate misleading hierarchically based judgments” (Spinelli, 1989) that may lead to wrong conclusions. Whatever the client brings forth is considered as important as anything else brought forth. Thus the therapist is not the one to choose what is more important for the client.

**Therapist:** I wonder who you are when you are yourself.

**Elisabeth:** I can do what I feel like. It is okay if I’m in bed or if I’m crying. No demands, no expectations. My parents respect my situation and me. They instinctively know what I need. It is like being a little girl again. It feels safe. I can hide until I’m ready to come back again. [Long thoughtful pause; therapist silently awaits further thoughts.] But then this is how I am when I’m having a bad day. [Cries] I don’t know who I am anymore. I used to be happy. I used to be busy. And interested. Will I be able to come back to life with a tinnitus like this?

Following the rule of horizontalization, everything just said by Elisabeth is of equal importance. The therapist is not to judge, for instance, whether it is more important to examine Elisabeth’s relation to her parents or to examine her thoughts on tinnitus. A choice has to be made on where to continue from. Thus the therapist first mirrors what he or she just heard. Assuming that Elisabeth verifies this, the therapist may continue as follows:

**Therapist:** Elisabeth, what would be most important for you right now? To go deeper into the bad days, to explore more whom you used to be, or to take a closer look at the parts of you that seem to have been lost?

This example does not imply that the client necessarily has to be asked every time what step to take next. The therapist can choose to go further into one direction but has to keep in mind that other directions may be important to explore further.

The existential therapist is mainly focused on the present because the present is seen as a result of both the past and the future. Therefore, the therapist’s mind is not occupied by speculations about possibly unresolved traumatic events experienced, for instance, in the client’s childhood, youth, or adulthood and their influence on tinnitus. Especially initially in therapy this is of great relevance because most people regard tinnitus as something incomprehensible that has come out of the blue. The client may risk feeling misunderstood, and may even develop
uncomfortable and suspicious feelings toward psychological therapy, if the therapist is focused on clarifying such influences.

Thus, metaphorically speaking, the therapist holds the map of the landscape while the client remembers all the many roads. The therapist also shows the map to the client, so that the person can clearly see how far he or she has come, what he or she has successfully gone beyond, and which roads seem to be out there waiting to be explored. This is done to make the client join the process of deciding which road to choose, while at the same time taking care that the client is not losing his or her way. At some point the client takes over the map.

We have outlined some of the important concepts of Tinnitus Person-Centered Therapy, realizing that not everything, for instance, the important philosophical theory on which existential therapeutic practice is based, has been explained. We refer the interested reader to our literature list. Throughout the rest of this chapter the reader will find the concepts elaborated when relevant.

We want to underline the fact that, in our experience, it is most important to meet every new client with tinnitus with an unbiased mind. Consequently, when talking with the client for the first time, we bracket our idea about tinnitus being the expression of something connected to personal problems: \textit{Maybe} something quite simple that, if treated appropriately, would bring relief, has been overlooked. \textit{Maybe} it is about personal problems. \textit{Maybe} the client will profit much more by cognitive-behavioral therapy.

To assess as precisely as possible which kind of intervention should be offered, we collect as much information as possible from the client.

\textbf{Clinical Protocol}

\textbf{The Initial Telephone Interview}

Potential clients first contact us by phone (except for a few who write us and whom we then ask to call). During the initial telephone call we conduct a basic interview that covers the following points.

\textbf{DETERMINING THE CLIENT’S PURPOSE FOR CALLING}

Why is the person calling right now? Has some special event occurred (e.g., onset of tinnitus, worsening of tinnitus)? Is he or she in need of urgent help for psychological intervention (e.g., in a severe crisis or suicidal)? Is the choice of going into psychological therapy undertaken randomly or as a result of careful consideration? Is the individual seeking advice (e.g., on partial masking or where to find an audiologist with a thorough knowledge of tinnitus) rather than wanting to go into therapy? Does he or she want an appointment?

Examining this point gives us an idea about the individual’s emotional state: how badly is the person doing, and why? Should we take the person on as a client immediately, or can the person wait 1 or 2 weeks? Is the person “shopping” for a cure? If so, he or she will most likely leave therapy after one or two sessions, thus wasting money and everyone’s time. Perhaps the person would be better off being referred to someone with an audiological background who can answer hearing questions and provide sound therapy.
DETERMINING THE CLIENT’S UNDERSTANDING OF THE ETIOLOGY OF TINNITUS AND INTERVENTIONS ALREADY UNDERTAKEN

This point addresses what the client knows of or has heard about the etiology of tinnitus, what other intervention(s) (than possibly psychological/psychiatric) the client actually has been offered (i.e., medical examination, hearing aids, noise generators) and whether this makes sense to the person.

It happens that the suffering diminishes or even disappears when information is given, scary misunderstandings are corrected, hearing aids or noise generators are offered, or the use of these devices is explained further. Here therapy often turns out to be irrelevant. When we encounter such unresolved problems, we either refer to the relevant professional or we take care of them ourselves—depending, of course, on whether we have the necessary knowledge. In this context we recommend that psychologists or psychotherapists treating tinnitus both acquire relevant knowledge about tinnitus and hearing and create a good professional interdisciplinary network that can provide the client with whatever support is needed.

DETERMINING WHY THE CLIENT HAS CHOSEN TO CONTACT THIS PARTICULAR CLINIC

We examine the expectations of the client as well as whether it is by accident that the person has chosen our clinic or whether the choice is based on particular knowledge of us. The aim is to understand whether the individual is seeking psychological help in general or is seeking us in particular after learning of our practice using Tinnitus Person-Centered therapy. This enables us to adjust expectations.

If the person’s choice is based on the fact that we prefer to use person-centered therapy, we want to clarify whether the client has any idea of what this actually implies. Being in existential therapy is very different from being, for instance, in psychodynamic-oriented therapy, and the client should be made aware of the most fundamental features characterizing existential therapies. Some of the more traditional psychotherapeutic concepts, such as the subconscious, repression, projection, transference, and countertransference, are not used in person-centered therapy. In line with this, the existential therapist does use the method of interpretation.

We examine whether the person’s call is a result of advice from a professional employed, for example, at the hearing clinic as well as the individual’s feelings about this advice. The recommendation can be relevant. However, sometimes the recommendation reflects the professional’s own feelings of hopelessness and depression that sometimes arise when working with people who seem impossible to help. Such feelings can be very scary and difficult to handle for a professional, especially if the professional has not learned a psychologically based method on how to cope with clients in crisis. In our experience it is important to keep in mind that the client may feel helped very well by the professional, especially if the professional just listens without taking steps toward action (referring or giving advice on how to get better), thus conveying the sense that the feelings expressed are both understandable and acceptable. If this is the need of the client, being recommended to seek psychological intervention may be experienced as a kind of rebuff on behalf of the professional. It may cause feelings of being wrong, unacceptable, or difficult or elicit ideas of having become
(or being made into) a “psychological case.” Such feelings can inhibit the therapeutic process and need to be addressed before therapy is initiated.

We recommend that clinicians without a good clinical psychological background seek psychological supervision of their work with difficult clients or refer to someone who does have that background. The ability to be helpful for clients who have severe feelings of hopelessness and sadness can be challenging.

Sometimes the client has been referred so that we can determine whether therapy can decrease the impairment of tinnitus so that the person can return to work. This situation can give rise to feelings of insecurity and suspicion. We examine whether such feelings are present because they can block the therapeutic process.

We determine whether the client has been encouraged to call us by a spouse, relative, friend, or colleague. If that is the case, does the client agree on this idea? What are the expectations of the spouse, relative, or colleague? Will we in reality have both the client’s and this other person’s expectations during therapy? Is the client at all motivated for psychological treatment? This needs to be clarified.

FINDING OUT ABOUT THE CLIENT’S PREVIOUS OR ONGOING EXPERIENCE WITH THERAPY

We determine whether the client has been in therapy before or is going to therapy somewhere else (e.g., with a psychologist or a psychiatrist). We determine whether the client is on any kind of medication, and if so why.

If the person has been in therapy previously and this has been a positive experience, then it may be possible to build on this in the new therapy. However, many clients have had negative experiences with a former therapist that risk being transferred to the new therapeutic relationship, blocking a smooth and fruitful relational development between client and therapist.

Sometimes it is seen that changing therapists reflects general problems with relating to others or enduring the development of a closer kind of relationship. Such a theme can give rise to problems, for instance, in couples counseling. In the sphere of tinnitus, the theme may arise if we encourage the client to relate in a different and more dialogue-focused way toward his or her tinnitus without having taken care of the existence of such a relational theme. Here the client may simply refuse such an idea, get angry, feel insulted, or even want to stop therapy. The problem also may appear disguised as wanting to end therapy quite suddenly. This often happens when the relationship between the therapist and client is developing, providing a safe base for opening up for very private considerations. If during the initial phone interview or during the first sessions of therapy we get the feeling that such a theme may be present, we gently mention this to the client (or wait until the right situation during therapy). If the client’s reaction confirms our thoughts during therapy, we will need to be observant of such situations. We’ll encourage the client to be aware of such feelings and mention them whenever they appear, to transform such themes into ways of being that may be more in the service of the client and the way the person wants to undertake his or her way of living.

We do not take clients into therapy who are at the same time undergoing psychological therapy. With clients taking drugs for psychiatric disorders, we
want to be sure that their psychiatrists are prepared to cooperate with us and that the psychiatrists are not undertaking psychotherapy. If so, we encourage the client to continue therapy with the psychiatrist. Generally speaking, we are more reluctant to take in clients with psychiatric disorders.

EXAMINING THE CLIENT’S PSYCHOLOGICAL “MINDEDNESS” AND EXPECTATIONS OF DURATION AND OUTCOME OF THERAPY

One of the aims of the existential therapies is to examine the client’s psychological “mindedness.” How do we best meet the individual’s expectations? Is the person able to enter into dialogue with his or her tinnitus, or will such an attempt be felt to be too “far out”? Is the client, generally speaking, reflective, or does he or she prefer concrete solutions, advice, and tools? Will it be of more help to the client’s needs, for instance, to provide cognitive-behavioral therapy or some kind of relaxation therapy, or will the person achieve more by applying the method of existential therapies? The choice of therapeutic method will be a result of the examination of this point and may very well exclude use of the existential approach.

Another aim is to examine how much time and money the client is prepared to invest when the outcome cannot be foreseen. Do the client’s expectations of duration of the therapy match our own? Does the individual have the impression that therapy has to go on for years, or only one or two sessions? This has to be clarified, as well as the client’s ability to pay for the therapy.

PROVIDING INFORMATION ABOUT ETHICS AND CONFIDENTIALITY

During the interview (when it seems appropriate) the client is informed that our interactions are strictly confidential.

It is our experience that most clients will expect the promise of confidentiality. However, most clients have not thought about what this actually means, whereas others, because of past medical experience, are used to interdisciplinary sharing of information. Therefore, they may not expect this discretion on our behalf. Going into psychological therapy, however, is something very special, something that the client does for himself or herself; it gives clients an opportunity to create a kind of secure and open-minded room of their own where all kinds of thoughts and considerations are invited to emerge. It is a safe place where the client can share thoughts not shared with anybody else but the therapist. Underlining the promise of secrecy will enhance the client’s feelings of confidence and safety.

SUMMING UP

We continue by giving a summary of what we think we have heard or understood during the initial interview. The purpose is to give the client the possibility to correct any misunderstandings or to explain further.

In light of all the information gathered through this initial interview, we usually have achieved a very clear idea, first and foremost, of whether we find ourselves prepared to take this individual into therapy and, second, of whether using the person-centered approach will be in the service of the client and his or her
sphere of problems. If both of these requirements are met, we introduce this to the client. If the client wishes to go into Tinnitus Person-Centered therapy, we briefly explain how it is undertaken.

Assuming that the client is prepared to go into therapy, we continue with the following points.

CLARIFYING FORMALITIES

This point informs the client of formalities, such as telephone hours, fee, observance of meeting hour, and rules for cancellation. These should all be addressed before therapy is undertaken.

It is our experience that being precise and structured gives the client a feeling of safety. Because the client actually is hiring the therapist, it is appropriate to make a contract regarding the frames and conditions for therapy that is both understandable and acceptable to the client.

The General Questionnaire

If the client is interested in starting therapy with us, we give a general questionnaire (see Fig. 15–1) and request that it be returned to us before the first session. Some really like this; others do not appreciate the idea of returning a completed questionnaire to someone they have not met. Of course, we respect this. If, however, the client is prepared to undertake this task (and most are), we underline the fact that the person should not feel obliged to answer questions that make him or her feel uncomfortable. Some of the questions have been touched on during the initial phone call. We encourage the client to repeat those answers in writing.

The primary objective is to obtain as much information as possible about the client that can add to the understanding of the client in his or her present situation. Therefore, the questionnaire covers all aspects of the individual’s life, including the possible resources of the client. The questions are formulated in an open way, thus giving clients the possibility to describe their present situation as freely as possible. Consequently, the word tinnitus is not mentioned. Therapists applying the existential framework may find the issue of the questionnaire quite contraindicated because working existential centered means meeting the client in that patient’s “here-and-now,” thus bracketing as much data and assumptions as possible. We have realized, however, that when it comes to a physical complaint like tinnitus, it is very important to “scan” as broadly as possible the client’s life history because sometimes events that the client either has forgotten or does not attach great importance to actually explain some of the difficulties adjusting to tinnitus. When the client takes the time to complete the questionnaire, such important events are apt to pop up. Also, it is our experience that clients seeking psychological help for their tinnitus suffering feel much safer and that their needs are met when we as therapists both meet them in their here-and-now and show a sincere interest in all the bits and pieces that through time have evolved and constitute their present life. For instance, we have experienced that early separation from some parents due to illness and a stay in a hospital has resulted in a sort of flowing anxiety interplaying with tinnitus in a negative way.
Tinnitus Background Questionnaire

Name: 
Age: 

1. Describe your difficulties as you see them. Mention the greatest difficulties.

2. How long you have had these difficulties?

3. How is your situation presently?

4. What has made you ask for help now (for example, a particular experience or a specific event)?

5. Do you have difficulties at work?

6. How do your difficulties affect your life in general?

7. How do you hope this therapy will help you?

8. Complete the following questions about your life.

<table>
<thead>
<tr>
<th>Parents</th>
<th>Present age or age at death</th>
<th>If they are deceased, how old were you when they died?</th>
<th>Occupation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mother</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Father</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name(s) of sibling(s), beginning with the eldest</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>Married?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9. Describe your education. Mention all education, completed or not.

<table>
<thead>
<tr>
<th>Age From/to</th>
<th>School</th>
<th>Major focus</th>
<th>Which subjects did you prefer?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10. Describe all work experience.

<table>
<thead>
<tr>
<th>Age From/to</th>
<th>Position</th>
<th>Reasons for end of work or other comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
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</tr>
</tbody>
</table>

11. What is your current work? What responsibilities do you have, and what are your future job prospects?

Figure 15–1  Tinnitus Background Questionnaire to be completed before the first session.
12. What are your interests outside of work?

13. How is your physical condition in general? Have you had any serious illness, or have you been exposed to misfortunes in your life?

14. Do you currently take any medications? If so which medications and what dosages?

15. Do you think that you have a problem with alcohol?

16. Have you been in psychiatric or psychological treatment before?

17. Provide important comments.

18. We would like to know something about your living relationship. (Underline what is right for you.)
   If you are married or with a partner, please answer the following questions:
   a. How long is your relationship?
   b. What is the age of your partner?
   c. What is your partner’s occupation?
   d. List your children (gender and age):

19. Have you been married before or lived with a partner?
   a. For how long?
   b. List the children (gender and age) from this relationship:

20. Are you unhappy/frustrated in your relationship/marriage and your present family life? If that is the case, please try to explain the difficulties.

21. Have you any particular sexual problems?

22. It would be a help to know something of your background. Please write about your childhood and your family, and note any important changes or separations.

23. Tell about your contact with other people and if they are satisfying to you.

24. Have you any particular problems with men or women?

25. Please tell what makes you happy and satisfied in life.

26. Please write information that you find important or significant here.

Figure 15–1 Tinnitus Background Questionnaire (continued)
The secondary objective is to provide for the client an opportunity to reflect upon his or her life, including what is important right now. If the most important thing right now is tinnitus, the client can choose to attach importance solely to tinnitus when completing the questionnaire. It is not uncommon that clients, during the process of completing the questionnaire, become aware of issues that may interplay with their suffering or become intrigued by some of their answers. Therefore, completing the questionnaire constitutes the first move toward being more reflective on and more curious about existential-centered issues such as the way one chooses to live life. One could say that by completing the questionnaire, the therapeutic process already is initiated before the client actually meets the therapist at the first session.

We end this first contact with the client by saying that the person is always welcome to contact us if any questions arise before the first session.

Preparing for the First Session

We carefully read the questionnaire to review the overall history of the client. The completed questionnaire may contain important information that we need to clarify further to assess whether this particular information is of (or will be of) importance for the present situation with tinnitus or for the therapeutic process. For example, the client might mention episodes of severe alcohol abuse or that one of the client’s parents died by some severe disease or died while the client was still a child. If there are such important issues, we will deal with them during the first session. Depending on the type of information as well as the client’s responses we may very well change plans for the undertaking of therapy/choice of method or refer the client to a more relevant regime. Normally, the thorough phone interview will have shed light on such things.

Going through the completed questionnaire invariably gives rise to some assumptions on the nature of the tinnitus suffering. One of the important tasks in existential therapy, however, is to gain insight into how the client experiences things as clearly as possible. If the therapist is not aware of his or her own assumptions and therefore cannot bracket them, these assumptions can make the picture of the client’s experience unclear. While going through the completed questionnaire, we therefore try to be aware of the nature of our assumptions. We keep them in mind because sometimes presenting the assumptions to the clients—after they have had the chance to clarify their situation—may add a new perspective on the client’s situation.

During therapy we will be very careful with bracketing what we think we know (stemming either from what the client has said to us on the phone or written in the questionnaire) in favor of grasping what the client actually is bringing into therapy. Bracketing what the client said on the phone is necessary because nobody is a static being. Consequently, something may have changed or developed since we first spoke with the client. We have to be open to this possibility—and this openness is achieved by bracketing. This is in line with existential philosophers who have claimed that human existence is fundamentally dynamic in nature (Cooper, 2004).

The rest of this chapter rests on the premise that the client is suited to therapy integrating the existential framework.
The First Sessions

At the first meeting we are careful to start with a bit of informal talk because this normally makes the client feel comfortable and welcome. It is our experience that clients need some time to adjust to this new situation, and we wish to support them in gathering themselves and their thoughts. We continue by encouraging clients to move their attention inward, reflecting upon what it feels like to be with us, the therapist, right now. At the first session this often gives rise to sentences like “I’m nervous” “This is new to me, I’m a bit excited,” and “I’m wondering if I can do this the right way.” Such considerations can be important to examine further. What are they about? What exactly is it that is making the client nervous, and does this influence tinnitus? What are the client’s thoughts on doing therapy “the right way”? Where do these thoughts come from? These considerations may lead to asking the client to be more explicit on how he or she would like therapy to be. Which demands does the client hold toward the therapist? What is important for the client in the therapeutic sessions? What would the client like to achieve? Hence quite early in therapy clients are trained to continuously be aware of their thoughts and needs and through this to get a clearer sense of who they are and who they truly want to be.

It is interesting to note that after a few sessions many of our clients adopt this procedure, subsequently introducing it in the beginning of every session. Actually, one could call this procedure a “tool”—a method of finding yourself right in this moment and explore how you are doing. Are things okay, or is there something that should be done or thought about in a different way to make you feel better? Training oneself in creating such a moment of reflection corresponds to what quite a few clients want to learn; namely, to be aware of the influence of life’s manifold challenges and how they in reality are affecting the individual.

In the first half of the first session we also go through the answers from the questionnaire, paying particular attention to the information that we have highlighted for clarification. We are especially careful to address information that may be of relevance to the client’s present situation with tinnitus. Depending on the content of the completed questionnaire, this may last for the rest of the first session.

At some point in the first half of the first session we explain that each therapeutic session belongs to the client and that it therefore is up to the client to decide where to start. Thus, at some point in the beginning of the session, we will say: So, where would you like to start?

During the first (and quite often also the second) session we are very attentive to whatever the client brings forth (e.g., whiplash due to car or motorcycle accident, episodes of depression or anxiety, diabetes). We consider these bits of information in the context of the client’s answers to some of the first questions on the questionnaire:

- Describe your difficulties as you see them.
- Mention the greatest difficulties.
- How long have you had these difficulties?
- How is your present situation?
- In what way do your difficulties affect your life in general?
- In what way do you hope the therapy helps you?
At the end of the first or the second session we extract themes or issues that we think could be valuable to work with during therapy, comparing these with what the client has answered on the questions mentioned above. Against this background we then try to determine the direction we should head and what should be achieved. We present our thoughts to the client, being very careful to make the client be as explicit as possible: Does the client agree with our thoughts, or are his or her thoughts and expectations headed in another direction? We want the client to be active and to take responsibility for the direction of the therapeutic process, and therefore we are willing to adjust our suggestions, as long as the client’s ideas make sense and are realistic. Therapy is not something that is done to the client but something that he or she is doing together with us.

Having come this far, we agree on a tentative number of sessions and the time between sessions. Having formulated this contract, therapy proceeds. From time to time the contract is reviewed to find out whether we are holding the direction, whether adjustment is needed.

How Is Therapy Undertaken?

In the first part of the therapeutic process, tinnitus most likely will be the pivotal point. Therapy, however, cannot change the fact that tinnitus is present. What may be achieved is a more rewarding way of regarding tinnitus, and this quite often happens, when the client can attach meaningfulness to the tinnitus. Then the client is freed from the disturbing, annoying, or scarring impact of tinnitus.

An important therapeutic strategy, therefore, is to redirect the client’s focus from tinnitus alone to the way the person tackles self-imposed demands, problems, and other dilemmas in life. When facing these issues, the client may realize that other ways of being in life will be much more in line with who he or she is and how he or she wants life to be. The next step is to set priorities as well as to investigate the consequences of the actions and new attitudes that grow during the therapy.

Thus the therapist has to listen to what the client says about tinnitus and be attentive to whatever else the client is conveying about how he or she exists in life. Let us return to the case study of Elisabeth. The therapist has asked her what would be most important for her to look into (horizontization).

Elisabeth: I don’t really know. I just wish you could tell me that tinnitus sooner or later will go away. But you can’t, I know that. [Pause] I just have to keep on running.

Therapist: What are you running away from?

Elisabeth: From my agony, from not being able to do anything but listen to tinnitus. I keep checking whether it has changed or is the same. . . . From the phone calls. I don’t want my friends talking to me in this situation. If I answer the phone or go to classes, I have to pretend—and I can’t.

Therapist: What are you pretending?

Elisabeth: That I’m myself, you know. Happy, cheerful, strong. The one that you can count on. Always there for the others. [Pause] It is such a fight to pretend. Ah—I don’t have the strength to pretend. Tinnitus is wearing me out.

Therapist: Do I get you right? Because of tinnitus, you cannot be together with anybody except your parents because you then fight to pretend that you are as you always have been, and this fight is too much for you. Is that so?

Elisabeth: That’s right.
Therapist: What would happen if you let some close friends see you the way you are now?

Elisabeth: I haven’t really thought about it. I just shut down. I’ve always done that when I’m sad. Down with the curtains and off to my parents. In bed. Always. [Pause] Why can’t I let them know how I am these days? [Pause] I guess that I have this idea that they would be shocked if they saw me like you see me now. [Cries silently; pause]

Therapist: Elisabeth, do I seem shocked?

Elisabeth: No, but then you don’t get shocked. You’re professional, used to people like me.

Therapist: So one has to be a professional or your parents in order not to be shocked seeing you so sad?

Elisabeth: No, that’s not what I am saying; it’s just that... well, I do hear that it could sound so... [Pause; stops sobbing] This is too far out! [Pause] What I mean is, well... I just think that I cannot very well show how I feel to my friends, not even the close ones. [Pause, then bursts out] I would feel so ashamed of myself! [Blushes] I feel so ashamed right now this very minute. [Starts crying again; a handkerchief is used for tears as well as for a kind of hiding away—the whole face is dried of tears several times.]

In this example, Elisabeth presents several of the bits and pieces that constitute a part of her life. One bit shows us her assumptions of what professionals can handle, another of how close friends will react when seeing her down. One is about what she can let close friends know of her and what she should hide from them. Another is about her way of coping with sadness and challenges (running away). All these need to be clarified.

It is very tempting to make therapeutic assumptions about how all these bits and pieces are interconnected. One of the therapeutic challenges is, as already mentioned, to continuously be aware of these assumptions, trying to bracket them while meeting the client in the now. The therapist, for instance, meets Elisabeth in the now when asking her: “Do I seem shocked?” The therapist here employs one of the strategies used in the existential therapies approach; namely, using the relationship between the client and the therapist to see what their relation is like, what it gives to the client, and from there to explore whether it differs from the relations that the client with others. The existential therapist also will encourage the client to use their relationship actively to try out new ways of thinking and being. Thus the therapeutic relationship is understood as human and represents the world outside the therapeutic room. This presupposes that the therapist is willing to step down from the professional pedestal, thus being both human and professional (and in this sequence).

In the example the intervention brings forth a new bit of information: Elisabeth’s feeling of being ashamed when revealing how badly she is doing. In other therapeutic frameworks at this point it might be of interest to explore where this feeling stems from; that is, to look into the past. When working existential, different feelings like shame will be explored, with the focus on how they are experienced by the client in the present and on how they can be evolved so that they are less stressful and negative. This is done with the intention of making the client able to experience feelings in a more differentiated and giving way, both in the present and in the future. Thus the next move of the therapist
could be questions like “Could you please stay with your feeling of being ashamed, as painful as it may be for you, and tell me more about it?”

What clients typically bring forth as answers to such questions are fearful considerations of revealing themselves as weak, imperfect. They may feel anxious about the reactions of others, of becoming a burden to others; they may have the idea that they are worth something only if they “are” a certain way, typically strong and cheerful, competent. Quite often such clients cannot imagine how to exist if they are not always hiding away such vulnerable parts of themselves.

One therapeutic step could be to make Elisabeth clarify what it would feel to learn that a close friend has always hid her anxiousness, sadness, and other stressful feelings. Another step could be to consider a more balanced way of living, for instance, by exploring how it would be to let a close friend know of the feelings that are difficult for Elisabeth to live with. Here the therapeutic relation could be used as a “test room”:

**Therapist:** Feeling ashamed is so stressful. [Pause] One really feels like hiding away. [Elisabeth nods affirmatively.] Yet you have been very courageous. You have stayed here with me, telling me something that you normally do everything to cover up. How does that feel? [Pause]

**Elisabeth:** Umm ... I feel relieved ... as if a pressure on my chest has diminished. I feel okay. [She looks straight at the therapist.]

**Therapist:** So, when it is possible for you to be so courageous with me, I wonder what it would give to you to tell a close friend how you are doing these days?

**Elisabeth:** I would feel more at ease ... less alone. [Long pause] This is quite overwhelming, you know. But I ... I’m on to something. Ruth ... Ruth is a close friend ... she can handle anything.

Here Elisabeth gets an idea of what new ways of being with others can give her. The therapist mirrors her and commends her for courage. He makes her attentive to her feelings. It is interesting to see that what comes up in Elisabeth’s mind isn’t tinnitus but a physical feeling of relief of pressure on the chest. Already at this point a shift of direction is evolving. Tinnitus is not the only physical feeling; for a moment something else is attracting Elisabeth’s attention; namely, that of how to relate to others. Elisabeth also conveys a new bit of her life that needs further exploration: “Ruth can handle anything.” What exactly is it that Ruth needs to handle?

The shift of the focus of existential therapy normally occurs gradually. For example, and with some surprise, the client may slowly begin to realize that when forgetting to invest energy and time in his or her own mental and physical well-being, tinnitus makes itself heard. From then on tinnitus is transformed as a source of information: “When are you, Tinnitus, most annoying, and why is that so?” “What do you take away from me, and what does your presence give me?” “What messages might you carry for me to uncover?” “What is it that you want from me, what are you telling me?” “Am I doing the right thing for me these days?” Tinnitus has been transformed into something meaningful.

Some clients come to the point of putting tinnitus in perspective, serving as an example of the challenges that life imposes on all human beings. Such clients start becoming very aware of the fact that anything can happen at any time. Because of
tinnitus, the client has learned that each of us has the freedom to decide which meaning we will attach to or create about the things that happen to us. As a consequence, tinnitus can be understood as something stressful and limiting. However, it also can be understood as something meaningful and expanding. Having come so far, other challenges may be regarded not as something limiting but as something that can contain new possibilities for development and meaningfulness. It is our experience that clients through such processes just described achieve a kind of freer feeling of how to be in life.

Tinnitus continues to be present, and from time to time the client still will find it very annoying. Many of our clients, however, use the sound of tinnitus to keep them on track, to be in touch with what is going on in their life, considering very carefully what their “take” is going to be. For them tinnitus has been transformed from “I have to learn to live with tinnitus” to “I can learn from tinnitus.”

Conclusion

There is no cookbook method to systemizing or manualizing Tinnitus Person-Centered Therapy. First, there exists no grand, all-encompassing system for how to undertake existential therapy (Cooper, 2004). Second, even if every existential therapist followed the overall principle for undertaking existential therapy for the same client, every course will have its own individual way of being (here existential therapy does not differ much from, for instance, psychodynamic-oriented therapy). The way in which the therapeutic process proceeds depends on the therapist’s choice of how to use the overall principles as well as on how the therapist is being in the world (remember that the therapist is not passive or reflective but is genuine and direct with clients; this in itself influences the therapeutic process), the client, the way the client exists in the world and whatever he or she brings forth, the relationship between the two of them, and how they move around together in the therapeutic landscape. Therapy is an individual enterprise.

Acknowledgment

The authors want to thank all of our clients who throughout the years have been our patient and most important collaborators in our process of being engaged in the ongoing challenge of trying to realize what existential therapy is about. Without their confidence and courage it would only have been a theoretical fantasy that we would have been able to describe in this chapter. The authors also have learned so much from the sources listed in the References section; each of them illustrates and explains the rich tapestry of existential practices. Readers who want to explore the philosophy of existential therapy should consult the writings of Medard Boss, Franz von Bretano, Martin Buber, Edmund Husserl, Martin Heidegger, Karl Jaspers, Søren Kierkegaard, Jean-Paul Sartre, and Maurice Merleau-Ponty.

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Scary Monsters and Waterfalls: 
Tinnitus Narrative Therapy for Children

ROSIE C. KENTISH AND SUSAN R. CROCKER

Stories are an integral part of young children’s lives. We work with the stories children and families tell us about tinnitus: their thoughts and feelings about it. We look at how tinnitus affects their life, and how life affects their tinnitus. Often their story is alive with negative connotations and emotions: tinnitus can be scary and frightening; tinnitus can be a monster. By changing children’s stories about tinnitus, we help them to see it in a new light. Monsters can be friendly too.

The child’s family will also have a story about tinnitus as they try to make sense of the child’s experience and the impact it has on their lives. Although this story may or may not be the same as the child’s, it will be equally alive. When the dominant story lies with the parents, this becomes the focus of intervention.

Stories about tinnitus are connected to the wider system around the child. Troublesome events in a child’s life, either at home or at school, can become attached to his or her story about tinnitus. Tinnitus can be seen as the cause of these difficulties or as a consequence.

Psychological work with children cannot be too prescriptive. Intervention must suit each child’s developmental level and follow a thorough assessment. Our intervention packages are tailored to the individual child and take account of the child’s age, audiological status, and life circumstances. Intervention may include individual therapy with the child, family, or school. We use a wide range of intervention strategies, including relaxation techniques and educational assessment. In this chapter, however, we have focused on therapeutic techniques for working with the preadolescent child. These techniques have developed from narrative therapy.

Children and Tinnitus

For many children, tinnitus may have been present from early on, the child only becoming aware of it in middle or late childhood when he or she is able to describe
it and discovers that others do not have the same auditory experience (e.g., Tyler and Smith, 2002). Children tend not to complain of tinnitus, and when they do, they should be taken seriously.

Our earlier survey of children presenting with troublesome tinnitus (Kentish et al., 2000) indicated that the impact of tinnitus on children’s experience is similar to that in adults. Sleeping problems, listening and concentration difficulties, and anxiety are the main areas most affected by troublesome tinnitus. As with adults, children’s tinnitus is often exacerbated during times of stress and emotional difficulty.

Although there are well-developed techniques for working with adults, little attention has been paid to developing techniques for children. Inevitably, this is a more complex area. Interventions must match the age and cognitive ability of the child. Young children do not have all the cognitive sophistication required for cognitive-behavioral therapy. The ability to reflect on their cognitions and emotions does not develop until late childhood. Nevertheless, we assume many of the same principles: tinnitus is affected by thoughts and feelings. We work with these in a child-friendly manner because every child loves a good story.

What Is Narrative Therapy?

Humans are, and always have been, story makers. Stories are our most familiar means of communicating the meaning we find in our experiences. Each of us holds stories about ourselves that help us to make sense of our life experiences, and these in turn have the effect of filtering an individual’s experience, thereby selecting what information gets focused in or focused out (Sween, 1999). The narratives we hold about ourselves help us to make sense of what happens to us. For each of us, our lives will be defined by how we respond to the experiences in our lives, as much as by the experiences themselves.

By looking at the stories and meanings associated with tinnitus, narrative therapy helps us start to disentangle why it is that for some children and families, tinnitus becomes problematic, and for others it is a matter of little or no consequence.

Stories about tinnitus held by children and families will in part be construed from their own personal experiences, but they will also be gained from the wider system within which they live. These influences include

- **The society within which the child lives (e.g., political and medical).** Within the child’s society are commonly held beliefs about tinnitus that the child and family may have heard from health, media, deafness, or hearing groups. These beliefs can have a powerful influence on how the family approaches tinnitus. Such beliefs may be that tinnitus is only associated with hearing loss, that it does not occur in children, and that it is a permanent or untreatable condition.

- **Community, school, and friends.** If we look at community, school, and friends, we can see that meanings and beliefs from these will be important in shaping the families ideas about childhood tinnitus. A teacher, for example, who has personal experience of tinnitus will respond to a child’s tinnitus quite differently from one who knows little about it.

- **Family and siblings.** Family stories about illness, hearing impairment, and hospitals will have a bearing on how treatment is approached. For example,
whether a family believes the child and feels that the tinnitus is important will affect the interactions among the family and child.

Children are influenced by the meanings and beliefs conveyed by the wider system around them, and even very young children will pick up their parents’ responses to illness, hospitals, and tinnitus. A commonly held view is that talking to a child about tinnitus may make it worse. A tinnitus consultation may therefore be the first time that a child has been allowed to voice his or her concerns in a developmentally manageable way.

Unique Outcomes

During the process of assessment, we aim to bring into the open the stories about tinnitus that are held by the child and family. When tinnitus is troublesome, these stories will inevitably be problem filled. We are listening, however, for examples of situations that contradict these dominant, problem-filled stories, and so bring to mind other, problem-free stories. For instance, a child may hold a story that “tinnitus always keeps me awake at night.” Always? If the child and family can think of a time when the child did get to sleep, even when the tinnitus was noisy, then we have begun to explore with them a new and different story that “tinnitus stops you from sleeping.” In narrative therapy these situations are called unique outcomes (White, 1988).

Mapping the Influence of Tinnitus

Tinnitus can have a significant effect on a child’s life, and its presence will inevitably affect the family also. No parent remains unaffected by seeing his or her child seemingly in pain and distressed. Difficulties listening in school and getting to sleep at night are often mentioned effects of tinnitus. Other difficulties in life, however, that may not be a direct outcome of tinnitus can also become connected, or mapped onto the tinnitus. A child who is having difficulties making friendships may believe that it is because of tinnitus.

Case Example: Trouble at home

Ten-year-old Susie had tinnitus for as long as she could remember. Over the past year, however, it had gradually worsened. Rarely present at school, it occurred most evenings at home. Susie’s mother was worried about talking to her about the tinnitus for fear of making it worse. Instead, she would try to distract her daughter by playing with her, or reading to her, often long into the night. Susie identified loud noises as triggering her tinnitus, and therefore the rest of the family was instructed to keep as quiet as possible. In particular, Susie identified arguments between Susie’s father and her teenage brother as being the main influence on her tinnitus. They frightened and worried her. Susie’s brother, however, was fed up with the limitations placed upon family life by Susie’s tinnitus. As psychologists we can see that Susie’s story about tinnitus was that it prevented family arguments. For her brother, tinnitus was sometimes the source.

Externalizing

Narrative therapy holds the view that “the person is never the problem; the problem is the problem” (Sween, 1999, p. 191). When people see a problem as an integral part of themselves, it is difficult for them to change, or to believe
that things can be different. We can see how tinnitus, by its very nature, can easily be seen as an integral part of oneself, and hard to change.

Externalizing is a process of helping the person to separate from the problem, and to see the problem (tinnitus) as something outside and separate from the person. This process of separation from the problem also helps relieve the person from all the negative thoughts, feelings, and ideas about tinnitus from which he or she has become inextricably linked. White (1988) noted that, among other things, it helps to decrease conflict and reduce feelings of failure and stress.

Thus, when we work with children in this way, we describe the tinnitus or problem in the third person; it is no longer ascribed to a person or relationship. In this way we do not say “your tinnitus” but “the tinnitus.” Care is taken not to use labels or diagnoses because they internalize rather than externalize the problem. With younger children we would use the name that the child uses (e.g., one child named his tinnitus noises “boum boums”). By taking the problem outside the person, it means that we can have an influence on it, and it does not add to an experience of helplessness.

Using externalizing as a technique for children allows us to introduce a more lighthearted and playful approach to therapy. The child can be invited to draw the problem (tinnitus), thus creating a depiction of the problem that can be looked at from outside the child. A soft toy also can be used to represent the tinnitus. The toy can be looked at and talked to, and new and different relationships can be explored with the tinnitus. For adults, such blurring of reality and imagination may seem strange or uncomfortable. However, we are entering into the playful and imaginative world of the child. For the child, externalization is like playing a game of “pretend.” Implicitly, or even explicitly, we are saying to the child, “Let’s pretend the problem is outside you, and we will play with it from there” (Sween, 1999).

**Interviewing the Young Child**

With young children, it is important not to apply the “child as a small adult” way of thinking. Developmental change is extensive within childhood. The child’s level of language and cognitive and social development will affect his or her understanding of tinnitus, as well as the ability to describe it and to participate in different kinds of treatment.

Research on children’s pain suggests that by around 7 years of age, children can give reasonably sophisticated descriptions of their pain. However, concepts of pain are qualitatively different. Adult-like (abstract and complex) understanding of illness does not occur until adolescence. The child’s cognitive and developmental status will influence the level of sophistication of illness concepts and pain-related beliefs (Siegel and Smith, 1989). Children may generate their own hypotheses and explanations for the causes of their pain or illness, in the absence of information that is complete, or given at a developmentally appropriate level (Bush, 1987). Children will thus construct their own “stories” to account for their tinnitus.

To understand the child’s story about tinnitus, we need information about the tinnitus, which is gathered in a child-friendly and developmentally appropriate way. This process cannot be hurried. Time spent in playing and drawing at the initial interview will help the child feel comfortable and at ease in a new and
strange environment. Play and drawing are also useful ways for young children to depict their ideas and feelings about tinnitus, particularly when language skills are limited. Most children enjoy drawing. A picture of what tinnitus looks like can be highly revealing and a useful starting point to the process of externalization.

Many health care professionals often adopt a closed form of questioning, requiring a yes/no form of answer. Indeed it has been shown that young children will often answer a nonsense question when presented in a closed format (e.g., “Is a jumper angrier than a tree?”). Children will often try to please adults by providing the answer they think the adult wants to hear. However, we know from studies that children generate more information from open-ended questions (Waterman et al, 2001).

A young child may not be able to describe the tinnitus in a temporal way. Frequency and duration are hard for the young child to assess. This information does need to be gathered, and it is best done through a recording chart over a period of time. Younger children are less able to link tinnitus to events or internal cognitions (e.g., how it made them feel) or their mood. As part of ongoing therapy, these connections need to be taught through intervention or through observations.

Clinical Protocol

Assessment

INFORMATION GATHERING

Information is gathered about the child’s tinnitus through multiple methods. Prior to the first appointment, the school is contacted for information about the child’s educational progress, friendships, or any other difficulties noted by the child’s teacher(s). Parents are sent the Tinnitus Parents’ Questionnaire, which the authors devised, which begins to focus on their understanding of the child’s tinnitus and the factors contributing to it (Fig. 16–1).

By the end of the initial assessment we should be able to answer the following questions.

Background Information

• Can we describe the child’s tinnitus (e.g., frequency, times of the day when it is most likely to occur)?
• Are there other associated health and psychological problems (headaches, dizziness, hyperacusis)?

The Influence of Tinnitus upon Life

• How does the tinnitus influence the child’s daily life (e.g., sleep difficulties, anxiety, depression)?
• Does the tinnitus influence the child’s school life (e.g., difficulties listening or concentrating in class)?
• How does the tinnitus influence friendships and family?

The Influence of Life on Tinnitus

• Are there current life events that have influenced tinnitus (e.g., family or school difficulties)?
The Tinnitus Story

- What do the child, family, and teacher know about tinnitus? How correct is this information?
- What are the beliefs within the family about the child’s tinnitus (e.g., the child is going deaf; the child has a brain tumor)?
- Who in the family is most worried about the child’s tinnitus (e.g., parent or child)?

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**Figure 16–1** Tinnitus Parents Questionnaire.

<table>
<thead>
<tr>
<th>Question</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. When did you first become aware of your child’s tinnitus?</strong></td>
<td></td>
</tr>
<tr>
<td><strong>2. How worried are you about it?</strong></td>
<td>Not at all Slightly Quite Very</td>
</tr>
<tr>
<td><strong>3. Do you think the tinnitus is affecting your child in any way?</strong></td>
<td>Yes No</td>
</tr>
<tr>
<td><strong>4. Has your child talked to you about their tinnitus?</strong></td>
<td>Yes No</td>
</tr>
<tr>
<td><strong>5. What information have you already been given about why your child has tinnitus?</strong></td>
<td></td>
</tr>
<tr>
<td><strong>6. Have you noticed or found any things that make your child’s tinnitus worse?</strong></td>
<td></td>
</tr>
<tr>
<td><strong>7. Have you noticed any things that make it better?</strong></td>
<td></td>
</tr>
<tr>
<td><strong>8. Thinking about other aspects of your child. Have there been concerns about any of the following?</strong></td>
<td>Hearing Glue ear High sensitivity to noise Asthma or allergies Frequent colds Balance Concentration and attention Tiredness</td>
</tr>
</tbody>
</table>
9. Do you think your child’s tinnitus affects him/her in any of the following areas?
   Sleeping (e.g., difficulty getting to sleep or waking in the night)

   Behaviour (e.g., temper tantrums, aggressive behaviour, withdrawn, or easily upset)

   Friendships (e.g., isolated from friends, difficulty hearing in a group)

   School (e.g., problems with school work)

   Mood (e.g., seems depressed, anxious, excitable, worried)

   Are there any other ways that tinnitus affects your child?

   Is there anything else that you think it is important for us to know about your child?

   Thank you for your help in completing this questionnaire

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**Figure 16–1**  Tinnitus Parents Questionnaire (continued)

- What stories does the family have about illness, hospitals, and hearing loss?

**Unique Outcomes**

- Can we identify situations or thoughts that contradict the dominant tinnitus story?
- Coping strategies: What has the child tried to do already to alleviate the tinnitus? Has this been successful?
- What have the parents tried to do to help the child? What effect has this had?

**The Initial Interview**

At the initial interview, all the family are invited to the appointment, but usually the parent(s) and child are seen together. The child and the therapist complete a questionnaire that the authors devised called Tinnitus and Me (Fig. 16–2). This relates to the questions outlined earlier in the section Information Gathering. The child is encouraged to personalize the booklet with coloring and drawings. The booklet is used as a guide only, and questions are adapted to suit the level of the child. This booklet serves the function of gathering information about the child’s understanding of tinnitus and hearing, as well as factors that influence them.

Past and present strategies for managing the child’s tinnitus are explored in the booklet. This is an important part of the assessment. Identifying strategies that have alleviated the tinnitus begins the process of changing the dominant story about tinnitus; the child and parent can begin to see that tinnitus is not something to be just passively endured.
By:
Age:
Date:

What is tinnitus?

Tinnitus is the noise you hear in your ears. It may be a buzzing, whistling, or hissing sound. The noise comes from your ears, and not from anything around you.

What do you hear?

Lots of children and adults hear these noises, sometimes for a long time, sometimes for a short time. Some children’s noises come and go, some hear them all the time. Some children feel upset and annoyed by them. Some children aren’t bothered at all.

How do you feel about your tinnitus?

Lots of children wonder why they hear these noises in their ears. Sometimes children worry about why they hear these noises. Are there things that you have worried about the tinnitus?

When I saw the Doctor, the Doctor told me things about my hearing, and about tinnitus. These are the things I know about my hearing, and about tinnitus.

My hearing:

Tinnitus:

Many children find there are things that can make tinnitus noises worse. What makes your tinnitus worse?

Some children find that the tinnitus noises get worse at certain times of the day or night. Are there any times when your tinnitus noises are worse?

There are lots of things I can do about it. Here are some things that make my tinnitus noises better.

At home:

At school:

Figure 16–2  Tinnitus and Me Child Questionnaire.
Formal measures of anxiety and depression also can be used. If necessary, the therapist will go through this with the child, depending on his or her age.

The remainder of the interview is used to map the influence of tinnitus on the child, and vice versa. We explore with the child and parent other events in the child’s life. We are interested to know why the child’s tinnitus has become troublesome at this point in time, and whether there are particular events either at home or at school that may be affecting the child. Common events include school examinations, difficulty getting along with the teacher, and difficulties with academic work; and at home, marital or other family difficulties, health problems in another family member, or bereavement.

Intervention

Next, we begin to unpack the tinnitus story. For each child and family, the dominant story may lie in one or all of the areas already described. Through assessment, we will have determined where intervention needs to be focused.

1. Fears and worries about tinnitus: information about tinnitus
2. Life stressors linked to tinnitus
3. Individual work with the child: externalization and visual imagery

FEARS AND WORRIES ABOUT TINNITUS

Providing the child and parents with factual information about tinnitus is often the first major turning point. This begins to answer worries such as: is my child going deaf? Negative beliefs and feelings of hopelessness are a common part of the story (e.g., “I will always have tinnitus and there is nothing I can do about it”). This may have been engendered by parts of the child’s system including medical professionals, as in the example of David.

Case Example: A story of fear

Nine-year-old David had a mild to moderate hearing loss. Due to an ear infection, he was prescribed a course of antibiotics from his medical practitioner. Although the ear infection cleared up, David developed a buzzing in both of his ears. Shortly after, his ear, nose and throat surgeon diagnosed tinnitus. He and his mother were told that there was nothing that could be done about it, and he must “go away and learn to live with it.” This devastated David and his mother. Over the forthcoming weeks he became increasingly distressed, then stopped sleeping and attending school.

Sadly, David’s story is not uncommon. Information about tinnitus began to focus on changing the story for David and his mother. First, they were reassured that there was much that could be done to help with the tinnitus. Changing this aspect of the story had a powerful effect for David and gave a story of hope.

LIFE STRESSORS LINKED TO TINNITUS

If there is an obvious association between an external life event and onset of troublesome tinnitus, then this will clearly need to be addressed, as will any educational or family difficulties.

INDIVIDUAL THERAPY WITH THE CHILD

Through discussion and play, we aim to find out, first, what the child’s tinnitus sounds like to the child, how it makes the child feel, and any images it conjures
up for him or her. Second, we ask the child to generate characters or images that will help him or her to see tinnitus in a different way and give the child a sense of being in control. During the interview with the child we are observing closely the child's response to various activities to see which works best.

1. The word tinnitus may be new to the child, so we first find out whether the child already has a name for it. If not, we ask the child what he or she would like to call it, and stick to that.

2. We ask the child to draw a picture of tinnitus. For those keen on drawing, this will be both pleasurable and engaging, and often works well with the older child.

3. We invite the child to play with a collection of toys. Depending on the age of the child, toys will include soft toys, miniature people, Lego pieces, and the latest cartoon and Disney characters. We also have a collection of less friendly-looking toys (our “monster” collection).

4. Side-by-side seating is less threatening. Young children rarely respond well to adult-style interviews.

5. We ask the child about activities that he or she enjoys doing at home, whether he or she has a favorite cartoon or superhero. We are looking for strong, powerful images for the child to use for support.

6. From Tinnitus and Me Questionnaire (Fig 16–2), we will already have some information about how often the child is affected by tinnitus, times of day and places it occurs most often, and feelings associated with it. We are now also interested in any visual images associated with it, both negative and positive. If images are strong, then the use of visual imagery techniques is indicated in intervention.

Through this process, we will have discovered whether the child works best through play, drawing, visual imagery, or a combination. The following case examples are used to show how we have used these to change children's stories about tinnitus.

**Case Example: Scary monsters** Seven-year-old Hannah had a past history of intermittent conductive hearing loss and eustachian tube dysfunction. She was troubled by intermittent tinnitus, which occurred both at school and at home. Hannah described difficulties listening in the classroom and keeping up with schoolwork. She was also distressed by her lack of friends and was verbally teased at school. Both Hannah and her mother shared the belief that these difficulties had arisen as a result of the tinnitus. Hannah’s teacher was surprised by her concerns, reporting that her schoolwork was average, but acknowledged Hannah’s lack of friends.

Hannah was invited to play with our collection of soft toys. Talking as she played, it became clear that Hannah believed that the noises were caused by having a monster in her head. This was very scary for her and was getting in the way of her concentration, listening, schoolwork, and friendships. Hannah selected a soft toy that she felt resembled her “monster,” and we seated this on the table in front of us. We used externalization techniques to think about the monster, what it was like, and to think of any times when the monster was not scary. We explained to Hannah what tinnitus was, and that there was not a real monster in her head; however, the noise at times might be so unpleasant that it seemed there was a monster there. Hannah was invited to talk to the monster and to ask the monster to be her friend. Hannah gave the monster a name, and we were
able to use the monster to fight the tinnitus noises. We thought about special powers that the monster might have, and how she might be able to get the monster to fight off the scary noises. This new story about the monster gave Hannah control over the scary noises.

For Hannah, the tinnitus noises were clearly scary. Furthermore, both Hannah and her mother believed that tinnitus was the cause of her other difficulties. By changing tinnitus into something more friendly and supportive, we were able to give Hannah a sense of power and influence over the tinnitus. Further sessions focused on helping Hannah address the separate difficulties she had with friendships and schoolwork.

**Case Example: Waterfalls**  Sophie, age 11, was referred with troublesome tinnitus that caused sleep problems and interrupted her education. She was profoundly deaf following meningitis and communicated orally via lip reading.

Night was worse for Sophie, after she took her hearing aids out. She described the tinnitus as sounding like “a telephone ringing nonstop,” also like traffic, beeps, and wind. Sometimes she had more than one sound at a time. She could not predict when it would get louder or “worse.” Sophie had learned to distract herself from the constant tinnitus noises by doing exercises, or “keeping busy.” At night she would read and “think good things,” and take her cats to bed to help her to sleep. The tinnitus would be there the moment she woke up, and she told me that she just wanted to be “normal,” and to know if it would go away when she got older.

At times she felt tense and anxious, so we practiced some relaxation techniques that could be used at any time of the day. We talked about the sounds of the tinnitus, discussing more fully the “wind” sound. We elaborated a story about trees and a river that she could think about when the tinnitus became troublesome. Sophie clearly enjoyed nature, and this conversation led to her telling me that she was going away camping soon after this meeting.

On her return a month later, Sophie told me that the tinnitus now reminded her of water and a beautiful place where she had camped near a waterfall. She said that by recalling this, although still present, her tinnitus was now no longer distressing.

Here, Sophie’s dominant story is of tinnitus as being an unpleasant and intrusive experience that must be endured. The tinnitus made her feel different from other people, and she feared that it would never change. However, an exception to this story was her pleasant image of tinnitus as wind, which she did not find intrusive. This allowed us to develop another story in which control and calm were present. For Sophie this came from her camping experience. Tinnitus could become a waterfall and a pleasant place to be, rather than feared. The conversations previously had allowed her to find a way of understanding the tinnitus noises, and she had been able to adapt her thoughts about the “wind” noise into something that recalled a pleasant experience. By relating the story about the waterfall, she was able to depict herself as strong and able to succeed over the tinnitus. She was able to take responsibility in changing the perception of tinnitus.

**Case Example: Superman to the rescue**  Nine-year-old Robert had tinnitus for as long as his mother could remember, but over the past few months it had become worse. He developed difficulties in getting to sleep and complained that he could not hear in class when his tinnitus was loud. His mother was concerned about his literacy difficulties and felt that he was finding school quite stressful. She described Robert as an anxious child and a worrier. Robert and his mother both feared that his worsening tinnitus might indicate that he was losing his hearing.
Robert enjoyed drawing, and with great enthusiasm he drew a picture of the tinnitus, which he depicted as a squiggly, snake-like creature. He called it Tin-monster (Fig. 16–3). He said that he felt afraid of the tinnitus, which would sneak up on him during lesson time at school and worm its way into his head through his ears. When not in his head, it would hide in the classroom, waiting for its moment to jump out at Robert.

Robert wanted to create his own character to support him in his fight against the Tin-monster. With great enthusiasm, he set about drawing a picture of Tin-man. An equally scary-looking creature, Tin-man was laden with all sorts of weapons that he could use to fight Tin-monster. Robert talked as he drew, and it was clear that his character was coming very much alive for him.

At the next session, Robert said that there had been several battles between Tin-monster and Tin-man. After each battle, Tin-monster had become a little weaker. He added some...
more weapons to his picture of Tin-man (Fig. 16–4). Robert’s general demeanor seemed brighter and stronger. He was also beginning to sleep better. Clearly, he was beginning to feel in charge.

Over the course of further sessions we talked about worries held by both Robert and his mother about Robert’s hearing and tinnitus. It also became apparent that Robert’s class was particularly noisy, in part accounting for his difficulties in listening. Robert’s mother discussed this with his class teacher, and with various changes, this improved also.

In this situation, drawing proved the most useful technique for helping to externalize the tinnitus. Through the support of his powerful new ally, Tin-man, Robert began to develop a new story about himself, a story in which he saw himself as being more powerful.

Conclusion

Intervention for children with tinnitus is highly effective, and we often see a dramatic difference within a few sessions. We focus on stories: the meanings, beliefs, and emotions children and families have about tinnitus. These stories are in part acquired through the wider context around them: from the media, teachers, medical professionals, audiologists, and friends. Families will bring their own stories about illness and hospitals that influence how they cope with tinnitus in the child. Families will also have stories about how they respond to the difficulties that life has sent their way—whether they see themselves as helpless victims or as a family who can rise to a challenge. These stories are highly complex.

We aim to bring to light the dominant stories that influence the child’s and families’ response to tinnitus. Young children will attempt to make sense of their tinnitus, and if adults fail to talk with them openly about tinnitus at their developmental level, they will construct their own explanation. Tinnitus really can be a monster.

We use externalization techniques to help children separate from their problem. Through drawing, play, and discussion, we learn their view of tinnitus. Once tinnitus is out in the open, we can then begin to construct a new and different story about it. This will include factually correct information about tinnitus and powerful new images of coping and of influence over tinnitus. As psychologists, we help separate the real impact of tinnitus on children’s lives from those that become associated with it. Not all problems in life are due to tinnitus.

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