

ONLINE FEATURE | Trilogy of Papers: Audiologist-Delivered Cognitive Behavioral Therapy for Tinnitus and Hyperacusis

Audiology Today

Cognitive Behavioral Therapy
Hyperacusis
Tinnitus
Tinnitus Management

Audiologists
New Professionals
Students

By Hashir Aazh and Ali A. Danesh

Tinnitus is the sensation of sound without any external acoustic source. Hyperacusis is intolerance of certain everyday sounds that causes significant distress and impairment in social, occupational, recreational, and other day-to-day activities (Aazh et al, 2016).

In hyperacusis patients, the sounds may be perceived as uncomfortably loud, unpleasant, frightening, or painful (Tyler et al, 2014). There are several randomized-controlled trials (RCTs) supporting the efficacy of cognitive behavioral therapy (CBT) for tinnitus and hyperacusis rehabilitation (Martinez-Devesa et al, 2010; Cima et al, 2012; Juris et al, 2014).

CBT is a psychological intervention that aims to alleviate distress by helping the patient to modify their unhelpful, erroneous cognitions and safety-seeking behaviors using behavioral and cognitive tasks (Beck, 1976; Clark et al, 1999). The content of the CBT intervention for tinnitus and/or hyperacusis used in these studies typically involves: education based on a CBT model of the processes underlying the distress caused by the tinnitus/hyperacusis, general use of counseling skills and empathic listening, filling out a diary of thoughts and feelings to help the patient identify their unhelpful thoughts and change them, relaxation exercises, and encouraging the patient to reduce their avoidance behavior with the

use of behavioral experiments (Martinez-Devesa et al, 2010; Cima et al, 2012; Juris et al, 2014). However, these studies were based on CBT delivered by qualified psychologists, not audiologists.

Why do some centers in the United Kingdom and elsewhere in the world offer audiologist-delivered CBT?

Although several studies support the efficacy of CBT delivered by psychologists or psychiatrists, many tinnitus patients may be reluctant to see them, believing that their problems are to do with the auditory system rather than being psychological in nature. Therefore, offering CBT delivered by audiologists may in fact improve access to this intervention for many patients. Moreover, of the patients who are referred to mental health services for tinnitus-related distress, many will, on further evaluation, not be considered as having a mental health problem that needs treating. This may be due to (1) lack of expertise in tinnitus and/or hyperacusis rehabilitation among mental health providers, (2) waiting times are long due to resource limitations and high demand, at least in the United Kingdom (Iacobucci, 2014). One solution to these problems is for therapies for tinnitus and hyperacusis to be delivered by audiologists rather than mental health specialists. In this trilogy of studies, the audiologists who delivered CBT focused on tinnitus and/or hyperacusis have been trained to deliver such intervention. For details of their training program see the original articles: (Aazh and Moore, 2018b; Aazh and Moore, 2018a; Aazh et al, 2019a; Aazh et al, 2019b).

What is audiologist-delivered CBT?

Audiologist-delivered CBT is broadly similar to CBT delivered by mental health professionals, as outlined earlier (Aazh et al, 2019b) and includes the following:

1. Empathic listening informed by the client-centered counseling method (Rogers, 1965);
2. Developing a case formulation that provides an explanation of the mechanism by which tinnitus and/or hyperacusis lead to distress, based on cognitive theory (Muran, 1991);
3. Application of behavioral experiments (BE) (Bennett-Levy et al, 2004) in order to explore and modify negative thoughts and safety seeking behaviors (SSB);
4. Keeping of a diary of thoughts and feelings (DTF) (Bennett-Levy, 2003; McManus et al, 2012) to provide a structured method for the patient to take notes about their tinnitus and/or sound-related problems and their associated thoughts and emotions.

The DTF is completed by patients between sessions. During the session, the audiologist uses the Socratic questioning style (Braun et al, 2015) to encourage the patient to think of the advantages and disadvantages of the thoughts that they recorded in the DTF, and to modify them if the patient decided that their thoughts were unrealistic or unhelpful. The CBT involves six individual face-to-face sessions, each lasting about one hour. A summary of the content of each session is provided in TABLE 1.

SESSION 1	<ul style="list-style-type: none"> • Exploration of tinnitus/hyperacusis-related distress using in-depth interview • Evaluation of the patient's cognitive, behavioral and emotional reactions to tinnitus/sound and the impact these have on their life. • Development of a cognitive behavioral formulation for tinnitus/hyperacusis distress • Enhancement of the patient's motivation for the therapy • Offer of full CBT or discharge
SESSION 2	<ul style="list-style-type: none"> • Design of a behavioral experiment (BE) to target and challenge troublesome thoughts • Patient to complete the BE as a between-session assignment
SESSION 3	<ul style="list-style-type: none"> • Reviewing and reflecting on the outcomes of the BE • Creation of counter-statements to negative thoughts • Issuing the diary of thoughts and feelings (DTF) to be filled in as a between-session assignment
SESSION 4	<ul style="list-style-type: none"> • Reviewing of the DTF and giving help to the patient to appraise and modify the thoughts responsible for producing tinnitus/hyperacusis-related distress • Issuing another DTF to be filled in as a between-session assignment
SESSION 5	<ul style="list-style-type: none"> • Reviewing of the DTF • Developing "acceptance" of tinnitus/hyperacusis • Further education about CBT
SESSION 6	<ul style="list-style-type: none"> • Reviewing and reflecting on progress • Discharge

TABLE 1. Summary of the interventions provided in each audiologist-delivered cognitive behavioral therapy (CBT) session for management of tinnitus and/or hyperacusis.

In a trilogy of studies conducted at the Tinnitus and Hyperacusis Therapy Specialist Clinic (THTSC) at the Royal Surrey County Hospital, in the National Health Service, United Kingdom patients' perspectives about effectiveness and acceptability of audiologist-delivered CBT for tinnitus and hyperacusis rehabilitation have been explored (Aazh et al, 2019b). The key aims of these studies determined the following:

1. What are the proportion and characteristics of patients who would benefit from audiologist-delivered CBT for tinnitus and hyperacusis rehabilitation?
2. What is the clinical effectiveness of audiologist-delivered CBT?
3. Patients' perspectives about the acceptability of audiologist-delivered CBT.
4. The aim of this article is to review the key outcomes of these trilogy of studies.

An international network of researchers from different disciplines has collaborated with THTSC in these studies consisted of Professor Brian C. J. Moore (Department of Experimental Psychology, University of Cambridge, United Kingdom) Professor

Ali A. Danesh (Department of Communication Sciences and Disorders, Florida Atlantic University, USA), and Dr. Christina Bryant (Melbourne School of Psychological Sciences, University of Melbourne, Australia).



From left to right: Brian C. J. Moore (Department of Experimental Psychology, University of Cambridge, United Kingdom), Dr. Christina Bryant (Melbourne School of Psychological Sciences, University of Melbourne, Australia), Professor Ali A. Danesh (Department of Communication Sciences and Disorders, Florida Atlantic University, USA), and Dr. Hashir Aazh (Tinnitus and Hyperacusis Therapy Clinic, Royal Surrey County Hospital (Guildford)).

The study populations in the studies cited here consist of patients who sought help from their general practitioners (GPs)/ primary care providers concerning their tinnitus and/or hyperacusis and who were referred to an audiology clinic. Therefore, the data reported in these studies may not be generalizable to other populations. However, these data are very relevant to audiology clinics around the world that provide therapy and support for patients with tinnitus and hyperacusis.

FIRST STUDY: What are the proportion and characteristics of patients who would benefit from audiologist-delivered CBT for tinnitus and hyperacusis rehabilitation?

Because audiologist-delivered CBT is resource intensive, we assessed the proportion and characteristics of patients who may benefit from CBT, the proportion who might take up the offer of CBT, and the completion rate. The results were intended to assist health service managers in resource allocation when planning to develop services.

The data for all patients who attended the THTSC in one-year period were included (n=266). TABLE 2 shows the mean and standard deviations (SD) of pure-tone hearing thresholds among the participants. Based on the pure-tone average (PTA) at the frequencies 0.25, 0.5, 1, 2, and 4 kHz for the better ear, 64 percent of patients (144 out of 224 with audiograms) had no hearing loss, 28 percent (62/224) had mild hearing loss, 6 percent (14/224) had moderate hearing loss, 1 percent (3/224) had severe hearing loss, and 0.5 percent (1/224) had profound hearing loss.

DESCRIPTION	0.25 Hz Mean (SD)	0.5 kHz Mean (SD)	1 kHz Mean (SD)	2 kHz Mean (SD)	3 kHz Mean (SD)	4 kHz Mean (SD)	6 kHz Mean (SD)	8 kHz Mean (SD)
Audiometric threshold (right ear) (dB HL)	18.3 (16) n=224	19.1 (18) n=224	20.2 (19) n=224	23.4 (21) n=224	28.6 (22) n=191	34 (24) n=224	41.4 (25) n=198	41.5 (28) n=224
Audiometric threshold (left ear) (dB HL)	18.3 (18) n=222	18.7 (19) n=222	19.5 (18) n=222	22.3 (30) n=222	30.4 (22) n=191	35.6 (25) n=222	43.8 (25) n=196	42.6 (27) n=222

TABLE 2. Means and SDs of the audiometric thresholds. The number of patients is indicated by n

The average uncomfortable loudness level (ULL) was 82 dB HL (SD=12 dB) for the ear with lower ULLs. Based on the average ULL in the ear with lower ULLs (ULL min), 22 percent (25/112) of patients had ULLs of 77 dB HL or below, which indicates hyperacusis (Aazh and Moore, 2017a).

Based on scores for the Tinnitus Handicap Inventory (THI) (Newman et al, 1996), 10 percent of patients (26/259) had no tinnitus handicap, 28 percent (73/259) had mild tinnitus handicap, 25 percent (65/259) had moderate tinnitus handicap, and 37 percent (95/259) had severe tinnitus handicap. Based on scores for the Hyperacusis Questionnaire (HQ) (Khalifa et al, 2002), 25 percent (59/240) of patients experienced hyperacusis handicap. Finally, based on scores for the Insomnia Severity Index (ISI) (Bastien et al, 2001), 30 percent (63/209) of patients did not have insomnia, 34 percent (70/209) had mild insomnia, 24 percent (50/209) had clinically significant insomnia, and 13 percent (26/209) had severe insomnia.

We found that following an initial assessment session, 68 percent (n=181) of patients were judged to have problems sufficient for them to be offered audiologist-delivered CBT (Aazh and Moore, 2018b). The remaining 32 percent (n=85) did not require to have any further sessions and were discharged. Of those enrolled for CBT, 31 percent (n =57) were discharged after the first CBT session, because they were judged to have insufficient tinnitus/and/or hyperacusis distress.

For 17 out of these 57 patients, emotional disturbances did not appear to relate to their tinnitus and/or hyperacusis and were more likely to be related to an underlying psychological disorder. Hence, they were referred for further psychological evaluations and possible treatment. Of those offered continuing CBT, 45 percent declined to continue. For 43 of these patients, the reason given for declining was that, because of receiving the assessment session and the first CBT session, they concluded that they were managing their symptoms reasonably well and no further action was needed. For the remaining 13/56 patients, the reasons for declining were: problems in finding sufficient time to attend (n=5), transport problems (n=3), other health issues with higher priority (n=4) and learning difficulty/decision made by a caretaker (n=1). Patients who continued were younger, had worse insomnia, and had better hearing in their better ear than patients who declined. Of those who continued, 68 percent completed the six sessions of CBT. Hence, although CBT is resource intensive, only 17 percent (n=46) of the total patient sample received the full course of six sessions of CBT.

SECOND STUDY: What is the clinical effectiveness of audiologist-delivered CBT for tinnitus and hyperacusis rehabilitation?

Prior to a RCT to examine the effectiveness of audiologist-delivered CBT for tinnitus and/or hyperacusis, we conducted a study of 68 consecutive patients who received such CBT (Aazh and Moore, 2018a). The average age was 52.5 years (SD=13 years, range 22 to 81 years), and 57 percent (39/68) were female.

Of the 68 patients who enrolled, 46 completed the CBT. There were no statistically significant differences between the 46 patients who completed the treatment and the 22 patients who dropped out in scores for the questionnaires, age, ULLmin and PTA of the better ear. Ten patients out of the 46 who completed CBT did not complete any of the post-CBT questionnaires and a few more did not complete all of the post-CBT questionnaires. In order to take into account the possible impact of the dropouts on the results of this study, two analyses of pre- and post-CBT outcomes were conducted.

The first analysis was based on all patients for whom post-treatment questionnaire scores were available. This provided a valid before/after comparison but ran the risk of over-estimating the benefits of CBT because it did not include data for patients who dropped out who might have found the CBT to be ineffective. The

second analysis, referred to as the “intention-to-treat analysis,” was intended to avoid any over-estimation of treatment effect. It was based on data for all patients who enrolled for CBT, i.e., who it was intended to treat, regardless of whether they finished the CBT. For patients with missing post-treatment outcomes (those who dropped out or for whom the data were incomplete), their post-treatment scores were set to the same values as the pre-treatment scores. If the CBT does not worsen the effects of the tinnitus and/or hyperacusis, this is a very conservative method of assessing the benefit of a treatment.

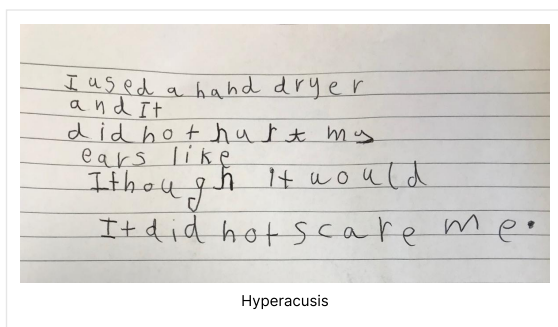
Pre-and post-treatment comparison of the self-report questionnaires showed significant improvements in THI, HQ, and ISI. TABLE 3 shows the means and SD of before and after treatment questionnaire scores based on all patients for whom post-treatment questionnaire scores were available. The effect size (ES) for each outcome measure was calculated as the mean difference between pre- and post-scores divided by the SD of the difference.

QUESTIONNAIRE	PRE-TREATMENT MEAN (SD)	POST-TREATMENT MEAN (SD)	p VALUE
THI (N = 36)	59.7 (19.5)	35.6 (20)	<0.001
HQ (N = 32)	20.1 (9.7)	14.9 (12)	0.0002
ISI (N = 26)	16.8 (6.2)	9.8 (7.4)	0.0001

TABLE 3. Means and SD of scores for the tinnitus handicap inventory (THI), the hyperacusis questionnaire (HQ) and the insomnia severity index (ISI) before and after audiologist-delivered cognitive behavioral therapy (CBT) for patients who completed CBT. The number of patients included in each analysis is indicated by N.

All measures improved significantly: ES values were 1.13 for the THI, 0.76 for the HQ, and 0.94 for the ISI. The results of the intention-to-treat analysis also showed that there were significant improvements for all measures. ES values were 0.72 for the THI, 0.51 for the HQ, and 0.58 for the ISI. This study did not have a control group. Therefore, it is difficult to assess the extent to which the measured improvements were produced specifically by the CBT as opposed to being a more general effect of receiving treatment (placebo effect) (Pocock, 1983). Studies with an RCT design are required in order to assess the efficacy of audiologist-delivered CBT for the management of tinnitus and hyperacusis. However, the results were promising, and the data obtained can be used in planning of an RCT with an appropriate control group.

THIRD STUDY: What are patients’ perspectives about the acceptability and effectiveness of audiologist-delivered CBT for tinnitus and/or hyperacusis rehabilitation?



The aim was to evaluate the views of patients who completed audiologist-delivered CBT about the effectiveness of the treatment and the acceptability of receiving CBT from audiologists using a survey questionnaire. This was a service

evaluation survey with a cross-sectional design. The study population comprised 40 consecutive adult patients who received a full course of audiologist-delivered CBT for tinnitus and/or hyperacusis management at the THTSC in a one-year period. All patients were asked to fill in the survey questionnaire. Nine patients missed their final session and, hence, did not complete the survey questionnaire.

The average age of the 31 patients who completed CBT was 48 years (standard deviation, SD =14 years, range 20 to 71 years), and 45 percent (14/31) were male. The average number of CBT sessions was 5.9 (SD=1.0). The total number of sessions was 4 for 2 patients, 5 for 3 patients, 6 for 24 patients, 7 for 1 patient and 10 for 1 patient. Based on the PTA for the better ear, 71 percent of patients (22 out of 31) had no hearing loss, 19 percent (6/31), had mild hearing loss, 7 percent (2/31) had moderate hearing loss, and 3 percent (1/31) had profound hearing loss. Based on the PTA for the worse ear, 52 percent of patients (16 out of 31) had no hearing loss, 36 percent (11/31) had mild hearing loss, 10 percent (3/31) had moderate hearing loss, and 3 percent (1/31) had profound hearing loss.

ULLmin values were 77 dB HL or below for 38 percent (9/24) of patients, which indicates hyperacusis (Aazh and Moore, 2017a). Based on scores for the HQ, 58 percent (18/31) of patients experienced hyperacusis handicap. Based on scores for the THI, 3.5 percent of patients (1/30) had no tinnitus handicap, 3.5 percent (1/30) had a mild tinnitus handicap, 23 percent (7/30) had a moderate tinnitus handicap, and 70 percent (21/30) had a severe tinnitus handicap. Based on scores for the ISI, 10 percent (3/29) of patients did not have insomnia, 17 percent (5/29) had mild insomnia, 42 percent (12/29) had clinically significant insomnia, and 31 percent (9/29) had severe insomnia. Based on scores for the GAD-7 and PHQ-9, 74 percent (23/31) of patients had anxiety and 68 percent (21/31) had depression.

Our results showed that for the question asking, "How effective is CBT in helping you manage your tinnitus/hyperacusis?", the median response was 8/10 (SD=1.6), and 90 percent of patients rated the effectiveness of CBT as 7 or above. For the question asking, "Are you able to manage your tinnitus and/or hyperacusis differently compared to before you started your treatment?", the median responses were 9/10 (SD=1.4), and 87 percent of patients rated their ability to manage their tinnitus and/or hyperacusis as 7 or above. For the question asking, "How acceptable was this [audiologist-delivered CBT] to you?", the median response was 10/10 (SD=1.1), and 97 percent of the patients rated the acceptability of audiologist-delivered CBT as 7 or above.

One might have expected that, because CBT is typically offered in mental health settings for the management of psychological disorders, it would not be acceptable to patients seen in outpatient audiology clinics for seemingly "ear-related disorders" of tinnitus and hyperacusis. However, contrary to this expectation, our results showed that most of the patients reported that it was very acceptable to them to receive CBT focused on tinnitus and hyperacusis from a specialist audiologist; the median of patients' responses to this question was 10/10. The responses to the question about the acceptability of audiologist-delivered CBT were not statistically different between the patients with and without hyperacusis handicap.

It is possible that patients ranked the audiologist-delivered CBT as acceptable because they did not fully understand the usual scope of practice of audiologists and simply assumed that CBT was part of the standard care model. However, this seems unlikely because the survey question included the statement that "Typically CBT is offered at mental health settings within the NHS. However, your CBT was provided in an Audiology Department by audiologists who are specialized in tinnitus and hyperacusis rehabilitation". It might be argued that if a patient enrolls in and completes an intervention, surely, they must have found it acceptable. Hence, acceptability studies should be carried out on those who did not receive or complete the intervention or perhaps on a focus group including a diverse range of participants. There are clearly some advantages to such methods. However,

patients who complete an intervention are in a very good position to comment on its acceptability. Also, an intervention might be completed even if it is not, in the end, considered to be effective because the patient may hope for some improvement.

Conclusions and Clinical Implications

Although audiologist-delivered CBT is resource intensive, it was only administered to a small proportion of patients seeking help for tinnitus and/or hyperacusis. About 32 percent of patients were determined to have little or no tinnitus and/or hyperacusis-related distress, and they were discharged after initial assessment. After the first CBT session, 21.4 percent were judged by the audiologist not to need any further sessions, and further, 16 percent felt one session was enough for them despite the audiologist offering the full course of treatment. Overall, only 17 percent of the total number of patients attended received the full CBT involving six sessions.

The protocol of audiologist-delivered CBT described in this paper gave promising improvements in scores for tinnitus handicap as measured via the THI, hyperacusis handicap as measured via the HQ, and insomnia severity as measured via the ISI. The effects were highly significant, and the ES values were medium or large. The methods described here maybe used when designing future RCTs assessing the effectiveness of audiologist-delivered CBT for the management of tinnitus and hyperacusis.

The majority of patients reported that it was very acceptable to them to receive CBT focused on tinnitus and hyperacusis from a specialist audiologist; the median response was 10/10. The majority of patients felt that the CBT was very effective (median response 8/10) and that they were able to manage their tinnitus and/or hyperacusis well (median response 9/10). To conclude, audiologist-delivered CBT is acceptable to patients and is effective in the management of tinnitus and/or hyperacusis from the patients' perspectives.

We observed that an audiologist-delivered CBT platform showed promising results. A close working alliance between audiology and mental health services is the key for a safe and effective therapy for patients experiencing tinnitus and hyperacusis. As a part of the routine care at THTSC in Guildford (United Kingdom), all patients undergo screening for psychological comorbidities. Approximately 65 percent of them will be referred for further psychological assessment and treatment (if needed) while they are receiving their specialized CBT focused on tinnitus and hyperacusis rehabilitation at the Audiology Clinic (Aazh and Moore, 2017b; Aazh and Moore, 2018c; Aazh et al, 2019c).

We acknowledge that in some countries, including the United States, performing CBT is not currently within the scope of practice of audiologists. Therefore, we advise caution in pursuit of CBT based tinnitus management without appropriate training and licensure. Nevertheless, a wide range of CBT techniques and general counselling skills as described in this article (e.g. modifying negative thoughts about tinnitus, completing diaries, behavioral experiments, psycho-education, empathic listening, etc.) are commonly used by audiologists in various tinnitus-management programs and are considered as an integral part of the aural rehabilitation.

What do audiologists think of offering CBT for tinnitus/hyperacusis?

Below is a paragraph from Viveka Owen, about what it is like to be an audiologist working within the tinnitus team:

“Our work is very different from regular audiology clinics. Our job needs a strong foundation in audiology but it strays into the world of mental health. About 60 percent of our patients have co-morbid mental health problems, therefore our role tiptoes the line between audiology and mental health on a daily basis. Although we follow protocols, the session content can vary dependent on the patient, for example some sessions can be an emotional roller-coaster. This can be anxiety provoking as we have to firmly remain in our remit but also provide support for people going through a difficult period in their lives which can leave them very vulnerable. Our team responds to these challenges by having weekly team meetings which allow us to talk to our colleagues to get their opinions, their past experiences of similar patients and allow us time to reflect. We all have a great working relationship and this gives us confidence that we can continue.”

What is it like to receive CBT from audiologists?

Below are a few testimonials from patients who received audiologist-delivered CBT from various members of the tinnitus team. This highlights the impact that treatment has on patients' lives.

PATIENT 1 (Seen by Jenni Stevens and Jennifer Whiffin):

“I was a mess when I first arrived. Jenni [Jenni Stevens] conducted my first appointment and I was delighted to learn I could try life without my hearing aids [Ear-level sound generators fitted for him elsewhere]-I have not worn them since.

I was then transferred to Jenny W [Jennifer Whiffin] and she is awesome, very knowledgeable, very caring and empathetic. She has educated me and I can now live with Tinnitus with very few caveats. The Tinnitus seminar was excellent.

My quality of life has changed massively as the result of my appointments with Jenny W. My sincere thanks to Jenny W and the whole team. Enjoy the cake!!”



From left to right: Jenni Stevens and Jennifer Whiffin

PATIENT 2 (Seen by Jemma Hatton and Viveka Owen):

“I think tinnitus is a very specific condition that is very difficult to appreciate if you have not experienced it or are not an expert in audiology. It is a condition that is with you all the time, at work or at rest, it is



From left to right: Jemma Hatton and Viveka Owen

inside your own head and feels inescapable. It is not an outside problem or an external issue to be resolved and to have someone understand that and combine it in with knowledge of hearing, hearing loss and hyperacusis is extremely important. I have had more general CBT for other issues in the past and think the targeted CBT approach in the audiology department made the CBT treatment as useful and relevant as it could be.”

PATIENT 3 (Seen by Dr. Hashir Aazh):

A six-year-old child with hyperacusis underwent the hyperacusis therapy based on the CBT approach and made significant improvement. During the therapy she learned how to explore her thoughts and modify them. After 3 sessions she wrote the text below which showed her progress in resolving her intolerance to sound. “I used a hand dryer and it did not hurt my ears like I thought it would. It did not scare me.”

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Author

Hashir Aazh

Dr. Hashir Aazh is the team lead for the Tinnitus and Hyperacusis Therapy Clinic, Royal Surrey County Hospital (Guildford). Hashir...

[See Full Bio](#)

Ali A. Danesh

Dr. Ali Danesh is currently a professor at the Department of Communication Sciences and Disorders, and has a secondary appointment...

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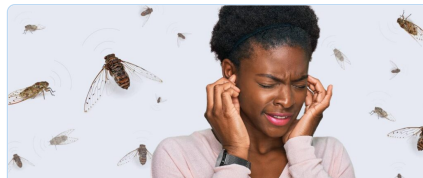
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