Dear friends and colleagues,

In the quest for the best strategy towards a cure for tinnitus Thomas Elbert has stressed that small group discussions are essential and referred to Steven Johnson’s bestseller “Where Good Ideas Come From”. This is the same author who previously wrote “Emergence”, which shares title with an earlier book of John Holland. Both titles of Steven Johnson’s books apply to TRI.

John Holland demonstrated that a small number of rules can generate coherent, emergent phenomena in complex systems. He proposes that emergence is more than the sum of independent activities and has applied this to ant colony behavior, computer chess playing, neural networks and to the spread of ideas.

Steven Johnson proposes that when enough individual elements interact/communicate and organize themselves, the result is collective intelligence, even though no one is in charge. He describes five important principles to induce emergence in a complex system. He illustrates the success of emergence in nature by the example of ant colonies, in which every ant operates based on a set of low level rules and feedback from its neighbours:

1. More is different: A critical mass is required for an emergent property, like an ant colony, to arise. One or two ants bumping against each other does not make a colony.
2. Ignorance is useful: The simplicity of ant language and the stupidity of individual ants is a feature, not a bug. There is no need for each ant to imprint a map, directing the colony’s best interest.
3. Encourage random encounters: These are essential for ants to stumble upon new food sources or to adapt to new environmental conditions.
4. Look for patterns in the signs: Pheromone trails lead ants to a food source and therefore to survival.
5. Look at your neighbor: „Local information leads to global wisdom.” When an ant notices a large number of his fellow ants foraging, it will alter its behaviour to a complementary activity.

continue next page
When Matteo de Nora created TRI he also envisioned that it would be composed of enough individuals interacting, communicating and organizing themselves, so that collective intelligence would emerge, with the ultimate goal of understanding and finding a cure for tinnitus. Thus, TRI was built upon and has followed the same five important principles of a complex system:

1. More is different: A critical mass will rapidly advance our knowledge.
2. Ignorance is useful: A naïve question can lead to an important discovery.
3. Encourage random encounters: This not only fuels our ideas but is also fun.
4. Look for patterns in the signs: These are essential to find new leads that will end in novel approaches.
5. Look at your neighbor: He is there to help you; in any complex system $1 + 1 > 2$.

Moreover, Johnson identifies “emergence” as a central aspect of innovation. More importantly, he explores why some environments squelch new ideas while others seem to breed them effortlessly:

1. Connect vs. Protect: "We are often better served by connecting ideas than we are by protecting them…they (ideas) want to complete each other as much as they want to compete."
2. Networks: “It’s not that the network itself is smart, it’s that the individuals get smarter because they’re connected to the network.”
3. Physical Location: “The ground zero of innovation is not the microscope, it’s the conference table…or the room with the coffee machine.”
4. Slow Hunch: The “Eureka moment” is less of a momentary event and more of a slow iterative and grinding process over time.

In order to continue advancing in our hunch for a tinnitus cure, we need your contribution to the liquid environment of round tables in coffee houses, beer pubs and wine bars, in order to connect rather than protect your ideas, during the 6th TRI Meeting. Physical Location: The artist’s city of Bruges, June 13th-16th 2012.

Belen Elgoyhen  Dirk De Ridder  Berthold Langguth  Sylvia Dorner-Mitschke
RESEARCH HIGHLIGHTS


This animal study demonstrates that hearing lesions cause specific changes in synaptic transmission in the auditory cortex with a decreased inhibitory function in the sensory deprived region and increased inhibitory and excitatory function in the nondeprived area. The reduced inhibition of the sensory deprived area is interpreted as consequence of homeostatic plasticity. Important consequences of these findings are that the reorganisation of the cortical map may not be pathological, but rather compensatory and that therapeutic efforts should aim at strengthening the deficient inhibition of the deprived area either by specific pharmacotherapy or by bringing information to the deprived region.


This study addresses the relevance of the autonomic nervous system for tinnitus distress and proposes an important role for the right anterior insula in mediating this effect.


By demonstrating that auditory perception can be modulated by deep brain stimulation in the caudate nucleus, this study highlights the gating role of the dorsal striatum for auditory information to reach perceptual awareness.
First Announcement
http://www.brai2n.net/tri2012

The 6th Annual TRI Conference will be held June 13-16, 2012 in Bruges (http://www.brugge.be), Belgium. This conference is becoming the major venue for tinnitus related research. In recent years presentation and poster content were applicable to a wide variety of clinicians and basic researchers alike. This year we will additionally foster presentations on innovative basic and clinical science.

The conference will again feature the high quality invited and keynote speakers, highlighting the latest developments in and around our field.

Special emphasis will be given to reserve time for social interaction, so as to promote networking inspired by the unbelievable beautiful medieval city of Bruges, surrounded by modern and ancient art, attractive century old buildings, and lots of wonderful bars and restaurants.

The venue is within a historical building, an old hospital (http://www.oudsintjan.eu) in the middle of the city center, with all major tourist attractions within walking distance.

**Oral Presentations** will cover unpublished preliminary or finalized data, novel ideas and techniques and are 15 minutes in length.

**Poster session** will also cover unpublished preliminary or finalized data, novel ideas and techniques, with the added value that viewers can study and restudy your information and discuss it with you one on one.

**Key Dates**
Deadline for all submissions and proposals: April 1st

**Exhibits** related to the theory, practice and education of tinnitus and related techniques are invited. Please request our exhibitor package for details.

More details can be found at the conference website (http://www.brai2n.net/tri2012). Contributors are encouraged to contact the conference coordinator for further information.

Hotels, within walking distance of the conference venue can be booked via the website.

We are looking forward to seeing you all in Bruges in June 2012!

Dirk De Ridder  Sven Vanneste  Paul Van de Heyning  Ana Belén Elgoyhen  Berthold Langguth

2012 Conference Organizers
Upcoming Meetings

Meetings exclusively dedicated to Tinnitus are marked red

### British Tinnitus Association Annual Conference

**When:** September 28, 2011  
**Where:** Sheffield, Yorkshire, UK  
**Contact:** British Tinnitus Association  
Kris Klytta  
**E-Mail:** krys@tinnitus.org.uk  
**Detailed Information:** [http://www.tinnitus.org.uk/bta-annual-conference](http://www.tinnitus.org.uk/bta-annual-conference)

### 28. Politzer Society Meeting

**When:** September 29 - October 1, 2011  
**Where:** Zappeion Exhibition Hall, Athens, Greece  
**Contact:** GOLDAIR Congress, 15 Panepistimiou Avenue, 10564 Athens, Greece  
**Phone:** +30 210 3274570  
**Fax:** +30 210 3311021  
**E-Mail:** info@politzer-athens2011.gr and/or congress@goldair.gr  

### 8th Meeting of the British Society of Neuro-Otology

**When:** October 14, 2011  
**Where:** National Hospital for Neurology and Neurosurgery, Queen Square, London  
**Contact:** Miss J. Mills, Neuro-Otology Group, Imperial College London, Charing Cross Hospital  
Fulham Palace Road London W6 8RF  
**Phone:** +44 (0)208 846 7285  
**Fax:** +44 (0)208 846 7577  
**E-Mail:** neuro-otology@imperial.ac.uk  
**Detailed Information:** [http://www.bsno.org.uk/8th%20meeting.html](http://www.bsno.org.uk/8th%20meeting.html)

### 56th International Congress of Hearing Aid Acousticians

**When:** October 19 - 21, 2011  
**Where:** CongressCenter Nürnberg, CCN East, Germany  
**Detailed Information:** [http://www.euha.org](http://www.euha.org)

### Asia Pacific Symposium on Cochlear Implant and Related Science

**When:** October 26 - 28, 2011  
**Where:** Korea  
**Detailed Information:** [http://knuh.knu.ac.kr](http://knuh.knu.ac.kr)
162nd Meeting of the Acoustical Society of America
When: October 31 - November 4, 2011
Where: San Diego, California, United States
E-Mail: asa@aip.org
Detailed Information: http://asa.aip.org/meetings.html

International State-of-the-Science Meeting on Blast-Related Tinnitus
When: November 15 - 16, 2011
Where: Northern Virginia, United States
E-Mail: robert.shull@amedd.army.mil

ASHA 2011 Annual Convention
When: November 17 - 19, 2011
Where: San Diego, CA, USA
Detailed information: http://www.asha.org/events/convention/

Tinnitus Adviser Training Course
When: November 18 – 19, 2011
Where: Nottingham, UK
Contact: British Tinnitus Association
Kris Klytta
E-Mail: krys@tinnitus.org.uk
Detailed Information: http://www.tinnitus.org.uk/tinnitus-adviser-training---november

Implantable Devices 2011: The State of the Art
When: November 25, 2011
Where: The National College for School Leadership, Nottingham, UK
Detailed information: http://www.earfoundation.org.uk/education/articles/603

ARO (The Association for Research in Otolaryngology) 35th MidWinter Meeting
Where: The Manchester Grand Hyatt Hotel, San Diego, CA, USA
Detailed information: http://www.aro.org/mwm/mwm.html
15. Jahrestagung der Deutschen Gesellschaft für Audiologie (DGA e.V.)
When: March 7 - 10, 2012
Where: Erlangen, Germany

American Auditory Society, Annual Meeting
When: March 8 - 10, 2012
Where: Scottsdale, AZ, USA
Detailed information: http://www.amauditorysoc.org/annual-meeting/reginfo.htm

DAGA 2012: 38. Jahrestagung der Deutschen Gesellschaft für Akustik DEGA
When: March 19 - 22, 2012
Where: Darmstadt, Germany
Detailed information: http://www.dega-akustik.de/

AudiologyNOW!® 2012
When: March 28 - 31, 2012
Where: Boston, MA, USA
Detailed information: http://www.audiologynow.org/

XXXI World Congress of Audiology
When: April 29 - May 3, 2012
Where: Moscow, Russia
Detailed information: http://www.wca2012.ru/

The Acoustics 2012
a joint meeting of the 163rd meeting of the Acoustical Society of America (ASA), the 8th meeting of the acoustical Society of China (ASC), the 11th Western Pacific Acoustics Conference (WESPAC) and the Hong Kong Institute of Acoustics (HKIOA)
When: May 13 - 18, 2012
Where: Hong Kong, China
Detailed information: http://acoustics2012hk.org/
I  Epidemiology

Audiogram configurations among older adults: Prevalence and relation to self-reported hearing problems.
Int J Audiol. 2011 Sep 15. [Epub ahead of print]

Hannula S, Bloigu R, Majamaa K, Sorri M, Mäki-Torkko E.

* Department of Clinical Medicine, Otorhinolaryngology, University of Oulu, Oulu, Finland.

Abstract Objective: There are only a few population-based epidemiological studies on audiogram configurations among adults. The aim of this study was to investigate the prevalence of different audiogram configurations among older adults. In addition, audiogram configurations among subjects reporting hearing problems were examined. Design: Cross-sectional, population-based, unscreened epidemiological study among older adults. Study sample: The subjects (n = 850), aged 54-66 years, were randomly sampled from the population register. A questionnaire survey, an otological examination, and pure-tone audiometry were performed. Results: The most prevalent audiogram configuration among men was high-frequency steeply sloping (65.3% left ear, 51.2% right ear) and among women, high-frequency gently sloping (33.0% left ear, 31.5% right ear). There were significantly more flat configurations among women than among men. Unclassified audiograms were common especially among women (17.5%). Subjects reporting hearing difficulties, difficulties in following conversation in noise, or tinnitus, more often had a high-frequency steeply sloping configuration than those not reporting. Conclusions: High-frequency sloping audiogram configurations were common among older adults, and a high-frequency steeply sloping configuration was common among those reporting hearing problems.

II  Pathophysiology

Interplay between spontaneous and induced brain activity during human non-rapid eye movement sleep.


Cyclotron Research Centre, University of Liège, B-4000 Liège, Belgium.

Humans are less responsive to the surrounding environment during sleep. However, the extent to which the human brain responds to external stimuli during sleep is uncertain. We used simultaneous EEG and functional MRI to characterize brain responses to tones during wakefulness and non-rapid eye movement (NREM) sleep. Sounds during wakefulness elicited responses in the thalamus and primary auditory cortex. These responses persisted in NREM sleep, except throughout spindles, during which they became less consistent. When sounds induced a K complex, activity in the auditory cortex was enhanced and responses in distant frontal areas were elicited, similar to the stereotypical pattern associated with slow oscillations. These data show that sound processing during NREM sleep is constrained by fundamental brain oscillatory modes (slow oscillations and spindles), which result in a complex interplay between spontaneous and induced brain activity. The distortion of sensory information at the thalamic level, especially during spindles, functionally isolates the cortex from the environment and might provide unique conditions favorable for off-line memory processing.
Deep resequencing of the voltage-gated potassium channel subunit KCNE3 gene in chronic tinnitus.

Behav Brain Funct. 2011 Sep 7;7(1):39. [Epub ahead of print]

Sand PG, Langguth B, Kleinjung T.

Membrane-stabilizing drugs have long been used for the treatment of chronic tinnitus, suggesting an underlying disturbance of sensory excitability due to changes in ion conductance. The present study addresses the potassium channel subunit gene KCNE3 as a potential candidate for tinnitus susceptibility. 288 Caucasian outpatients with a diagnosis of chronic tinnitus were systematically screened for mutations in the KCNE3 open reading frame and in the adjacent region by direct sequencing. Allele frequencies were determined for 11 known variants of which two (F66F and R83H) were polymorphic but were not associated with the disorder. No novel variants were identified and only three carriers of R83H were noted. However, owing to a lack of power, our study can neither rule out effects of KCNE3 on the risk for developing chronic tinnitus, nor can it exclude a role in predicting the severity of tinnitus. More extensive investigations are invited, including tests for possible effects of variation in this ion channel protein on the response to treatment.

Lateralized Auditory Cortical Alpha Band Activity and Interregional Connectivity Pattern Reflect Anticipation of Target Sounds.

Cereb Cortex. 2011 Sep 5. [Epub ahead of print]

Müller N, Weisz N.

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The anticipation of stimuli facilitates the top-down preparation of neuronal tissue involved in the processing of forthcoming targets. Increasing evidence in the visual modality emphasizes the anticipatory adjustment of visual cortex excitability through modulations of oscillatory alpha power. In the auditory system, however, this relationship has not yet been established. Furthermore, the association between anticipatory modulations of auditory alpha power and a potential top-down network within these anticipatory preparation processes remains unexplained. To disclose these processes, we recorded magnetoencephalography while visually cuing participants to attend to either ear and to anticipate forthcoming auditory stimuli. For the cue-stimulus phase, we expected an asymmetric modulation of auditory alpha power when attending to the left or right ear, assuming that frontoparietal regions would phase synchronize with the auditory cortex in an asymmetric pattern. Beamformer source solutions demonstrate an asymmetric modulation of auditory alpha power following visual cues expressed in a strong right auditory alpha power increase when attending to the right ear. Furthermore, the right auditory cortex is functionally connected to the frontal eye fields during the ipsilateral alpha increase. Altogether, these results contribute significantly to the understanding of how auditory anticipation acts on a local as well as on a network level.

Tinnitus and hearing loss and changes in hippocampus.

Seminars in Hearing; Volume 32, Issue 2, 2011, Pages 203-211.

Salvi R.¹, Langguth B.², Kraus S.¹, Landgrebe M.², Allman B.¹, Ding D.¹, Lobarin E.³

¹ Center for Hearing and Deafness, Department of Communicative Disorders and Sciences, University at Buffalo, Buffalo, NY 14214, United States, ² Department of Psychiatry and Psychotherapy, Interdisciplinary Tinnitus Clinic, University of Regensburg, Regensburg, Germany

Approximately 12 to 14% of adults experience tinnitus and prevalence estimates for tinnitus in children range from 12 to 37% in those with normal hearing and up to 66% with those with hearing loss. Approximately 1% of patients suffer from debilitating tinnitus that requires clinical treatment or intervention. The neural mechanisms responsible for tinnitus, however, remain elusive. Because tinnitus is often associated with cochlear hearing loss, the phantom sound of tinnitus was traditionally believed...
to originate in the cochlea. More recently, modern brain imaging methods employing positron emission tomography have identified regions in the central auditory pathway (auditory cortex, medial geniculate body) and limbic system (hippocampus) that are activated when patients with somatic tinnitus voluntarily change the loudness of the phantom sound by moving the face, jaw, or upper torso. Somatic tinnitus appears to develop as a function of somatosensory system invasion of the deafferented (deafened) regions of the auditory cortex. Additionally, the involvement of the hippocampus in tinnitus gains further credence from structural imaging studies that reveal a significant decrease in hippocampal gray matter in tinnitus patients. The hippocampus, a structure involved with memory, mood, and spatial navigation, is a major site of neurogenesis in the adult brain. New data suggest that unilateral noise exposure resulting in deafness significantly suppresses the birth of newborn neurons in the hippocampus and leads to memory impairment in noise-exposed animals. Copyright © 2011 by Thieme Medical Publishers, Inc.

**Homeostatic plasticity drives tinnitus perception in an animal model.**


Helen Wills Neuroscience Institute and Department of Molecular and Cell Biology, University of California, Berkeley, CA 94720.

Hearing loss often results in tinnitus and auditory cortical map changes, leading to the prevailing view that the phantom perception is associated with cortical reorganization. However, we show here that tinnitus is mediated by a cortical area lacking map reorganization. High-frequency hearing loss results in two distinct cortical regions: a sensory-deprived region characterized by a decrease in inhibitory synaptic transmission and a normal hearing region showing increases in inhibitory and excitatory transmission and map reorganization. Hearing-lesioned animals displayed tinnitus with a pitch in the hearing loss range. Furthermore, drugs that enhance inhibition, but not those that reduce excitation, reversibly eliminated the tinnitus behavior. These results suggest that sensory deprivation-induced homeostatic down-regulation of inhibitory synapses may contribute to tinnitus perception. Enhancing sensory input through map reorganization may plausibly alleviate phantom sensation.

**Effect of salicylate on potassium currents in inner hair cells isolated from guinea-pig cochlea.**
Neurosci Lett. 2011 Aug 27. [Epub ahead of print]

Kimitsuki T, Ohashi M, Umeno Y, Yoshida T, Komune N, Noda T, Komune S.

Department of Otolaryngology, Graduate School of Medical Sciences, Faculty of Medicine, Kyushu University, 3-1-1 Maidashi, Higasi-Ku, Fukuoka 812-8582, Japan.

Although salicylate is one of the most widely used nonsteroidal anti-inflammatory drugs, it causes moderate hearing loss and tinnitus at high-dose levels. In the present study, salicylate effects on the K currents in inner hair cells were examined. Salicylate reversibly reduced the outward K currents ($I_{K}$), but did not affect the inward current ($I_{K}$). Salicylate blocked the outward K currents in a concentration-dependent manner according to Hill equation with a half-blocking concentration of 1.66mM, and the Hill coefficient of 1.86. Copyright © 2011. Published by Elsevier Ireland Ltd.

**Insular lateralization in tinnitus distress.**
Auton Neurosci. 2011 Sep 1. [Epub ahead of print]

Van der Loo E, Congedo M, Vanneste S, De Heyning PV, De Ridder D.

BRAI²N & Department of Neurosurgery, University Hospital Antwerp, Belgium.

Tinnitus affects 15% of the population. Of these 1-2% are severely disabled by it. The role of the autonomic system in tinnitus is hardly being investigated. The aim of this study is to investigate the relationship between tinnitus distress and lateralization of the anterior insula, known to be involved in
interoceptive awareness and (para)sympathetic changes. For this, Tinnitus Questionnaire scores are correlated to Heart Rate Variability markers, and related to neural activity in left and right anterior insula. Our results show that tinnitus distress is related to sympathetic activation, in part mediated via the right anterior insula. Copyright © 2011 Elsevier B.V. All rights reserved.

Urocortin-expressing olivocochlear neurons exhibit tonotopic and developmental changes in the auditory brainstem and in the innervation of the cochlea.


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The mammalian cochlea is under direct control of two groups of cholinergic auditory brainstem neurons, the medial and the lateral olivocochlear neurons. The former modulate the electromechanical amplification in outer hair cells and the latter the transduction of inner hair cells to auditory nerve fibers. The lateral olivocochlear neurons express not only acetylcholine but a variety of co-transmitters including urocortin, which is known to regulate homeostatic responses related to stress; it may also be related to the ontogeny of hearing as well as the generation of hearing disorders. In the present study, we investigated the distribution of urocortin-expressing lateral olivocochlear neurons and their connectivity and distribution of synaptic terminals in the cochlea of juvenile and adult gerbils. In contrast to most other rodents, the gerbil’s audiogram covers low frequencies similar to humans, although their communication calls are exclusively in the high-frequency domain. We confirm that in the auditory brainstem urocortin is expressed exclusively in neurons within the lateral superior olive and their synaptic terminals in the cochlea. Moreover, we show that in adult gerbils urocortin expression is restricted to the medial, high-frequency processing, limb of the lateral superior olive and to the mid and basal parts of the cochlea. The same pattern is present in juvenile gerbils shortly before hearing onset (P 9) but transiently disappears after hearing onset, when urocortin is also expressed in low-frequency processing regions. These results suggest a possible role of urocortin in late cochlear development and in the processing of social calls in adult animals. J. Comp. Neurol. 519:2758-2778, 2011. © 2011 Wiley-Liss, Inc.

Deep brain stimulation in area LC controllably triggers auditory phantom percepts.

Neurosurgery. 2011 Aug 12. [Epub ahead of print]

Larson PS, Cheung SW.

*Neurological Surgery, University of California at San Francisco, San Francisco, California; †Otolaryngology-Head and Neck Surgery, University of California at San Francisco, San Francisco, California.

BACKGROUND: Tinnitus is predominantly viewed as the consequence of dysfunctional hyperactivity, plastic change or synchronized oscillations in the central auditory system. An alternative to the current auditory-centric view of auditory phantom perception is the basal ganglia-centric view. Recent electrical stimulation experiments in area LC, a locus of the caudate nucleus positioned at its anterior body, has shown loudness modulation of existing tinnitus percepts.

OBJECTIVE: To demonstrate auditory phantoms are gated by the dorsal striatum.

METHODS: Electrical stimulation in area LC through a DBS lead was performed in 6 interactive adult subjects (3 with and 3 without chronic tinnitus) undergoing surgery to treat movement disorders. Tinnitus loudness was rated on a 0 to 10 scale, sound quality was described and localization was referenced to one or both ears.

RESULTS: Short-term area LC stimulation triggered new phantom tones, clicks, and frequency modulated sounds in 5 subjects, and altered sound quality of an existing tinnitus in 1 subject. Results from this study indicate that perceptual awareness of auditory phantoms is contingent on satisfying a permission condition controlled by the dorsal striatum. Potential auditory phantoms are not automatically
gated to reach perceptual awareness. A phantom percept gate control model is proposed. **CONCLUSION:** Neuromodulation of area LC can trigger temporary gate dysfunction and reversibly release new phantoms for conscious awareness. Restoration of restrictive dorsal striatal gate function to treat problematic phantom percepts may be realized by adopting long-term area LC neuromodulation and choosing optimal stimulation parameters.

**Imaging of thalamocortical dysrhythmia in neuropsychiatry.**

**Schulman JJ, Cancro R, Lowe S, Lu F, Walton KD, Llinás RR.**
Department of Physiology and Neuroscience, New York University School of Medicine New York, NY, USA.

Abnormal brain activity dynamics, in the sense of a thalamocortical dysrhythmia (TCD), has been proposed as the underlying mechanism for a subset of disorders that bridge the traditional delineations of neurology and neuropsychiatry. In order to test this proposal from a psychiatric perspective, a study using magnetoencephalography (MEG) was implemented in subjects with schizophrenic spectrum disorder (n = 14), obsessive-compulsive disorder (n = 10), or depressive disorder (n = 5) and in control individuals (n = 18). Detailed CNS electrophysiological analysis of these patients, using MEG, revealed the presence of abnormal theta range spectral power with typical TCD characteristics, in all cases. The use of independent component analysis and minimum-norm-based methods localized such TCD to ventromedial prefrontal and temporal cortices. The observed mode of oscillation was spectrally equivalent but spatially distinct from that of TCD observed in other related disorders, including Parkinson’s disease, central tinnitus, neuropathic pain, and autism. The present results indicate that the functional basis for much of these pathologies may relate most fundamentally to the category of calcium channelopathies and serve as a model for the cellular substrate for low-frequency oscillations present in these psychiatric disorders, providing a basis for therapeutic strategies.

**The neural network of phantom sound changes over time: a comparison between recent-onset and chronic tinnitus patients.**

**Vanneste S, van de Heyning P, De Ridder D.**
TRI Tinnitus Clinic, Brai²n, TRI & Department of Neurosurgery, University Hospital Antwerp, Wilrijkstraat 10, 2650 Edegem, Belgium Brai²n, TRI & ENT, University Hospital Antwerp, Edegem, Belgium.

Tinnitus is characterized by an ongoing conscious perception of a sound in the absence of any external sound source. Chronic tinnitus is notoriously characterized by its resistance to treatment. In the present study the objective was to verify whether the neural generators and/or the neural tinnitus network, evaluated through EEG recordings, change over time as previously suggested by MEG. We therefore analyzed the source-localized EEG recordings of a very homogenous group of left-sided narrow-band noise tinnitus patients. Results indicate that the generators involved in tinnitus of recent onset seem to change over time with increased activity in several brain areas [auditory cortex, supplementary motor area and dorsal anterior cingulate cortex (dACC) plus insula], associated with a decrease in connectivity between the different auditory and nonauditory brain structures. An exception to this general connectivity decrease is an increase in gamma-band connectivity between the left primary and secondary auditory cortex and the left insula, and also between the auditory cortices and the right dorsal lateral prefrontal cortex. These networks are both connected to the left parahippocampal area. Thus acute and chronic tinnitus are related to differential activity and connectivity in a network comprising the auditory cortices, insula, dACC and premotor cortex. © 2011 The Authors. European Journal of Neuroscience © 2011 Federation of European Neuroscience Societies and Blackwell Publishing Ltd.
Detection of ototoxicity.

Campbell, K.C.M.
Department of Audiology Research, Office 3341, Southern Illinois University School of Medicine, 801 N. Rutledge, Springfield, IL 62702, United States.

Ototoxicity monitoring is particularly critical in patients receiving platinum-based chemotherapy or long-term aminoglycoside antibiotic administration. Furthermore, as new otoprotective agents are developed, audiologists need to not only be able to monitor for ototoxicity but know the various criteria for early detection of ototoxicity and how to grade ototoxic adverse events. The three primary methods for ototoxicity monitoring are conventional audiometry, high-frequency audiometry, and otoacoustic emissions. However, early detection and adverse event criteria depend primarily on conventional and high-frequency audiometry. No consensus exists on determining significant changes in otoacoustic emissions secondary to ototoxic drugs. Also, no consensus exists on how to monitor for tinnitus, although it is a common complication in these patients. Currently, tinnitus surveys can be helpful. A baseline evaluation is critical for accurate interpretation of auditory threshold results. Thus, a team approach is needed to ensure adequate care of these children. For clinical trials and in reading the literature, audiologists need to be aware of the American Speech Language Hearing Association’s 1994 criteria for detection of ototoxic change, and the Common Terminology Criteria for Adverse Events, Brock, and the Change scales for classification of adverse events. These methods and scales are reviewed and discussed. Copyright © 2011 by Thieme Medical Publishers, Inc.

Tinnitus interferes with daily life activities: a psychometric examination of the tinnitus disability index.

Cima RF, Vlaeyen JW, Maes IH, Joore MA, Anteunis LJ.
1Department of Clinical Psychological Science, Maastricht University, Maastricht, The Netherlands; 2Adelante, Centre of Expertise in rehabilitation and Audiology, The Netherlands; 3Research Centre for Health Psychology, Department of Psychology, University of Leuven, Leuven, Belgium; and Departments of 4Clinical Epidemiology and Medical Technology Assessment and 5Otorhinolaryngology & Head and Neck Surgery, University Hospital Maastricht, Maastricht, The Netherlands.

OBJECTIVES: Tinnitus Disability Index (TDI) is presented as a novel and brief self-report measure for the assessment of the interference of tinnitus with performance in specific daily life activities. We hypothesized that the TDI is a reliable and valid measure and that tinnitus disability is strongly associated with tinnitus severity, subjective tinnitus intensity ratings, and ratings of general health.

DESIGN: Six hundred fifteen tinnitus patients from across the Netherlands completed online a number of questionnaires about their tinnitus, their general health, and demographics. Two samples were extracted by a random split: Sample I (N = 311) for exploratory factor analysis and Sample II (N = 304) for confirmatory analysis, using structural equation modeling. One hundred forty-three of the first included respondents repeated assessment after a 2-wk time interval for test/retest analysis. Regression analyses were employed to investigate construct validity.

RESULTS: Present analyses reveal that tinnitus disability, as measured with the TDI, might be best understood as a single-component construct, that is, one single underlying factor. The TDI is reliable over time, and tinnitus-related disability, as measured with the TDI, is strongly associated with subjective ratings of tinnitus intensity, negatively associated with quality of life ratings, and distress due to tinnitus.

CONCLUSIONS: The TDI is a brief and easily administered index measuring a unique construct, namely the experienced interference of the tinnitus with daily life activities, which is invaluable in the assessment and treatment of tinnitus patients.
Catastrophizing and fear of tinnitus predict quality of life in patients with chronic tinnitus.


Cima RF, Crombez G, Vlaeyen JW.

1Department of Clinical Psychological Science, Maastricht University, Maastricht, The Netherlands; 2Adelante, Centre of Expertise in rehabilitation and Audiology, The Netherlands; 3Department of Experimental-Clinical and Health Psychology, Faculty of Psychology and Educational Sciences, Ghent University, Ghent, Belgium; and 4Research Centre for Health Psychology, Department of Psychology, University of Leuven, Leuven, Belgium.

OBJECTIVES: It is well established that catastrophic misinterpretations and fear are involved in the suffering and disability of patients with chronic pain. This study investigated whether similar processes explain suffering and disability in patients with chronic tinnitus. We hypothesized that patients who catastrophically (mis)interpret their tinnitus would be more fearful of tinnitus, more vigilant toward their tinnitus, and report less quality of life. Moreover, tinnitus-related fear was expected to act as a mediator in reduced quality of life.

DESIGN: Sixty-one tinnitus patients from an outpatient ENT department of the University Hospital of Antwerp (Belgium) completed a number of questionnaires about their tinnitus. Hierarchical regression analyses were performed to test hypothesized associations and to assess mediation by tinnitus-related fear.

RESULTS: Analyses revealed significant associations between catastrophizing and fear and between catastrophizing and increased attention toward the tinnitus. Furthermore, both tinnitus-related catastrophizing and fear were negatively associated with quality of life; moreover, tinnitus-related fear fully mediated the association between catastrophizing about the tinnitus and quality of life.

CONCLUSIONS: The findings confirm earlier suggestions that tinnitus-related concerns and fears are associated with impaired quality of life, which is in line with a cognitive behavioral account of chronic tinnitus. Future research avenues and clinical applications are discussed.

Readability of patient-reported outcome questionnaires for use with persons with tinnitus.


Atcherson SR, Zraick RI, Brasseux RE.

University of Arkansas at Little Rock, University of Arkansas for Medical Sciences, Little Rock, AR.

OBJECTIVES: The readability of 15 tinnitus-focused, patient-reported outcome (PRO) questionnaires was analyzed.

DESIGN: Reading grade levels were analyzed using the Flesch Reading Ease, FOG, and FORCAST formulas as computed by a readability calculations software package.

RESULTS: The results of this study demonstrate that the majority of questionnaires exceeded the fifth- to sixth-grade reading levels recommended by health literacy experts regardless of the formula applied.

CONCLUSIONS: In the demand for standardization of tinnitus assessment tools, developers and clinicians should consider readability as another testable construct, as poor readability may affect both validity and reliability.

AICA syndrome with facial palsy following vertigo and acute sensorineural hearing loss.

Auris Nasus Larynx. 2011 Aug 20. [Epub ahead of print]

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We report a case of infarction of the anterior inferior cerebellar artery (AICA) with peripheral facial palsy following vertigo and acute sensorineural hearing loss. A 39-year-old female presented with vertigo...
and sudden hearing loss, tinnitus, and aural fullness of the right ear. An audiogram revealed a severe hearing loss at all tested frequencies in the right ear. Spontaneous nystagmus toward the left side was also observed. Otoneurological examinations showed sensorineural hearing loss of the right ear and horizontal and rotatory gaze nystagmus toward the left side, and a caloric reflex test demonstrated canal paresis. Initially, we diagnosed the patient for sudden deafness with vertigo. However, right peripheral facial palsy appeared 2 days later. An eye tracking test (ETT) and optokinetic pattern test (OKP) showed centralis abnormality. The patient’s brain was examined by magnetic resonance imaging (MRI) and magnetic resonance angiography (MRA) and showed an infarction localized in the pons and cerebellum. MRI and MRA revealed infarction of the right cerebellar hemisphere indicating occlusion of the AICA. Consequently, the patient was diagnosed with AICA syndrome but demonstrated regression following steroid and edaravone treatment. We suggest that performing MRI and MRA in the early stage of AICA syndrome is important for distinguishing cerebellar infarction resulting from vestibular disease. Copyright © 2011 Elsevier Ireland Ltd. All rights reserved.

Prevalence and significance of high-frequency hearing loss in subjectively normal-hearing patients with tinnitus.
Annals of Otology, Rhinology and Laryngology; Volume 120, Issue 8, August 2011, Pages 523-528.

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Objectives: We investigated the incidences of high-frequency hearing loss (HFHL; above 2 kHz) and extended high-frequency hearing loss (EHFHL; above 8 kHz) in patients with tinnitus and subjectively normal hearing, and evaluated their effects on the clinical and audiological features of the patients.

Methods: The sample included 85 patients with sensorineural tinnitus who had normal hearing sensitivity in the frequencies from 250 Hz to 2 kHz, and who had undergone extended high-frequency audiometry between July 2009 and February 2010. We investigated the incidences of HFHL and EHFHL in these patients and analyzed the significance of the hearing losses. Results: The incidence of HFHL or EHFHL was 88%. The proportion of patients with EHFHL, among the patients who had normal hearing sensitivity up to 8 kHz, was about 74%. The patients with normal hearing sensitivity at all test frequencies were significantly younger, had larger otoacoustic emissions, and had tinnitus that was less loud as measured by tinnitus matching than did the subjects with HFHL and/or EHFHL. However, other comparisons of clinical factors in the three groups did not show any differences. Conclusions: Even if patients with tinnitus do not have any subjective hearing impairment, most of them have HFHL and/or EHFHL. The effects on the clinical features of the patients are still vague. © 2011 Annals Publishing Company. All rights reserved.

IV Imaging

Insular lateralization in tinnitus distress.
Auton Neurosci. 2011 Sep 1. [Epub ahead of print]

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Tinnitus affects 15% of the population. Of these 1-2% are severely disabled by it. The role of the autonomic system in tinnitus is hardly being investigated. The aim of this study is to investigate the relationship between tinnitus distress and lateralization of the anterior insula, known to be involved in interoceptive awareness and (para)sympathetic changes. For this, Tinnitus Questionnaire scores are correlated to Heart Rate Variability markers, and related to neural activity in left and right anterior insula. Our results show that tinnitus distress is related to sympathetic activation, in part mediated via the right anterior insula. Copyright © 2011 Elsevier B.V. All rights reserved.
Contralateral parahippocampal gamma-band activity determines noise-like tinnitus laterality: a region of interest analysis.
Neuroscience. 2011 Aug 30. [Epub ahead of print]

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Tinnitus is described as an auditory perception in the absence of any external sound source. Tinnitus loudness has been correlated to sustained high frequency gamma-band activity in auditory cortex. It remains unknown whether unilateral tinnitus is always generated in the left auditory cortex, irrespective of the side on which the tinnitus is perceived, or in the contralateral auditory cortex. In order to solve this enigma source localized electroencephalographic (EEG) recordings of a homogenous group of unilateral left and right-sided tinnitus patients presenting with noise-like tinnitus was analyzed. Based on a region of interest analysis, the most important result of this study is that tinnitus lateralization depended on the gamma-band activity of the contralateral parahippocampal area. As for the auditory cortex no differences were found between left-sided and right-sided tinnitus patients. However, in comparison to a control group both left and right-sided tinnitus patients had an increased gamma-band activity in both the left and right primary and secondary auditory cortex. Thus whereas in tinnitus the primary and secondary auditory cortices of both sides are characterized by increased gamma-band activity, the side on which the tinnitus is perceived relates to gamma-band activity in the contralateral parahippocampal area.

V Pharmacotherapy

Successful Amelioration of Tinnitus in a Stroke Patient by Low-dose Gabapentin.
J Stroke Cerebrovasc Dis. 2011 Sep 7. [Epub ahead of print]

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Bilaterally progressive tinnitus and hearing impairment occurred in a hypertensive patient shortly after an episode of right ganglionic hemorrhage. Audiometric tests showed a mixed sensorineural and conduction hearing loss. When low-dose gabapentin was administrated for the pre-existing postherpetic thoracic neuralgia, the tinnitus dramatically improved but recurred after discontinuation of the drug. Hearing function did not change. In view of a controversy of gabapentin and tinnitus in previous trials, the findings in this patient support that low-dose gabapentin benefits the subgroup of tinnitus patients with secondary contributing factors, such as stroke. Copyright © 2011 National Stroke Association. Published by Elsevier Inc. All rights reserved.

Betahistine in the treatment of tinnitus in patients with vestibular disorders.

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Betahistine is a medicine used to treat vestibular disorders that has also been used to treat tinnitus. AIM: To assess the effects of betahistine on tinnitus in patients with vestibular disorders. MATERIAL AND METHOD: Retrospective data were collected from patient records for individuals presenting with vestibular dysfunction and tinnitus. Patients included had received betahistine 48 mg/day and clinical outcomes were compared with a control group comprising individuals who were unable to receive betahistine due to gastritis, ulcers, pregnancy, asthma or hypersensitivity to the drug. Patients underwent control of any aggravating factors and also standard vestibular exercises as a basis for
treatment. The intensity, frequency and duration of tinnitus were assessed on the first day of dosing and after 120 days of treatment. Clinical improvement was defined as a total or partial reduction of tinnitus after treatment.

RESULTS: Clinical improvement was observed in 80/262 (30.5%) of patients treated with betahistine and 43/252 (17.1%) of control patients. Betahistine significantly (p<0.0001) improved tinnitus in treated individuals.

CONCLUSIONS: The daily dosage of 48 mg of betahistine during 120 consecutive days is useful to reduce or eliminate tinnitus in patients with vestibular disorders.

Melatonin: can it stop the ringing?

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OBJECTIVES: We sought to report the efficacy of oral melatonin as treatment for chronic tinnitus and to determine whether particular subsets of tinnitus patients have greater benefit from melatonin therapy than others.

METHODS: This was a prospective, randomized, double-blind, crossover clinical trial in an ambulatory tertiary referral otology and neurotology practice. Adults with chronic tinnitus were randomized to 3 mg melatonin or placebo nightly for 30 days followed by a 1-month washout period. Each group then crossed into the opposite treatment arm for 30 days. The tests audiometric tinnitus matching (TM), Tinnitus Severity Index (TSI), Self Rated Tinnitus (SRT), Pittsburgh Sleep Quality Index (PSQI), and Beck Depression Inventory (BDI) were administered at the outset and every 30 days thereafter to assess the effects of each intervention.

RESULTS: A total of 61 subjects completed the study. A significantly greater decrease in TM and SRT scores (p < 0.05) from baseline was observed after treatment with melatonin relative to the effect observed with placebo. Male gender, bilateral tinnitus, noise exposure, no prior tinnitus treatment, absence of depression and/or anxiety at baseline, and greater pretreatment TSI scores were associated with a positive response to melatonin. Absence of depression and/or anxiety at baseline, greater pretreatment TSI scores, and greater pretreatment SRT scores were found to be positively associated with greater likelihood of improvement in both tinnitus and sleep with use of melatonin (p<0.05).

CONCLUSIONS: Melatonin is associated with a statistically significant decrease in tinnitus intensity and improved sleep quality in patients with chronic tinnitus. Melatonin is most effective in men, those without a history of depression, those who have not undergone prior tinnitus treatments, those with more severe and bilateral tinnitus, and those with a history of noise exposure.

VI Auditive Stimulation

Cochlear implantation has a positive influence on quality of life, tinnitus, and psychological comorbidity.

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OBJECTIVES: To determine the effect of cochlear implantation (CI) on health-related quality of life (HRQoL), tinnitus, and psychological comorbidity in patients with severe to profound postlingual hearing loss and to analyze the relationship between these parameters.

STUDY DESIGN: Prospective study.
METHODS: Using six validated questionnaires, we evaluated the pre-CI and post-CI scores of HRQoL, tinnitus, perceived stress, symptoms of depression and anxiety, and coping strategies in 43 patients implanted unilaterally with a multichannel implant for at least 6 months.

RESULTS: In addition to improvements in hearing, speech understanding, and disease-specific HRQoL, psychological comorbidity was reduced and coping strategies were improved following CI. In the 39 tinnitus patients, their tinnitus was reduced. We found negative correlations between HRQoL and stress, depression, and anxiety. Pre-CI, tinnitus severity did not correlate with HRQoL and psychological comorbidity. However, patients with a high-level tinnitus had lower HRQoL as well as a higher level of perceived stress and anxiety symptoms than patients with a low-level tinnitus and no/incidental tinnitus before CI. Moreover, patients with severe hearing loss had a higher level of perceived symptoms of stress and depression than patients with profound hearing loss before CI.

CONCLUSIONS: The present study provides evidence that tinnitus and psychological comorbidity may play an important role in the rehabilitation of CI patients, and that there is a correlation between HRQoL and these parameters. In addition to hearing tests, tinnitus, stress, and psychological comorbidity should be assessed using validated questionnaires before and after CI. This will help to improve the rehabilitation process. Copyright © 2011 The American Laryngological, Rhinological, and Otological Society, Inc.

Cochlear implantation for Meniere's disease.
Laryngoscope; Volume 121, Issue SUPPL. 5, 2011, Pages S328.


Sunnybrook Health Sciences Centre, University of Toronto, Canada.

Background/objective: Only a small number of patients with Meniere Disease (MD) go on to have bilateral severe-profound sensorineural hearing loss. These patients may benefit from cochlear implantation (CI) but only a few small studies have been published describing outcomes. Our goal was to describe our experience with 21 such patients. Methods: Chart review and review of a large prospectively-gathered CI database. CI outcomes for patients with MD were compared to those for age-, sex- and devicematched controls. Results: Patients in the MD group scored as well as controls on speech discrimination measures. They improved, but to a lesser degree than controls, on quality of life measures. Tinnitus did not significantly improve. There were few reports of vertigo postop. Conclusions: Patients with MD with bilateral severe-profound SNHL are excellent CI candidates. Few reported postop dizziness.

VII Brain Stimulation

Deep brain stimulation in area LC controllably triggers auditory phantom percepts.
Neurosurgery. 2011 Aug 12. [Epub ahead of print]

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BACKGROUND: Tinnitus is predominantly viewed as the consequence of dysfunctional hyperactivity, plastic change or synchronized oscillations in the central auditory system. An alternative to the current auditory-centric view of auditory phantom perception is the basal ganglia-centric view. Recent electrical stimulation experiments in area LC, a locus of the caudate nucleus positioned at its anterior body, has shown loudness modulation of existing tinnitus percepts.

OBJECTIVE: To demonstrate auditory phantoms are gated by the dorsal striatum.

METHODS: Electrical stimulation in area LC through a DBS lead was performed in 6 interactive adult
subjects (3 with and 3 without chronic tinnitus) undergoing surgery to treat movement disorders. Tinnitus loudness was rated on a 0 to 10 scale, sound quality was described and localization was referenced to one or both ears.

RESULTS: Short-term area LC stimulation triggered new phantom tones, clicks, and frequency modulated sounds in 5 subjects, and altered sound quality of an existing tinnitus in 1 subject. Results from this study indicate that perceptual awareness of auditory phantoms is contingent on satisfying a permission condition controlled by the dorsal striatum. Potential auditory phantoms are not automatically gated to reach perceptual awareness. A phantom percept gate control model is proposed.

CONCLUSION: Neuromodulation of area LC can trigger temporary gate dysfunction and reversibly release new phantoms for conscious awareness. Restoration of restrictive dorsal striatal gate function to treat problematic phantom percepts may be realized by adopting long-term area LC neuromodulation and choosing optimal stimulation parameters.

VIII Behavioral Therapy

Catastrophizing and fear of tinnitus predict quality of life in patients with chronic tinnitus.

Cima RF, Crombez G, Vlaeyen JW.

OBJECTIVES: It is well established that catastrophic misinterpretations and fear are involved in the suffering and disability of patients with chronic pain. This study investigated whether similar processes explain suffering and disability in patients with chronic tinnitus. We hypothesized that patients who catastrophically (mis)interpret their tinnitus would be more fearful of tinnitus, more vigilant toward their tinnitus, and report less quality of life. Moreover, tinnitus-related fear was expected to act as a mediator in reduced quality of life.

DESIGN: Sixty-one tinnitus patients from an outpatient ENT department of the University Hospital of Antwerp (Belgium) completed a number of questionnaires about their tinnitus. Hierarchical regression analyses were performed to test hypothesized associations and to assess mediation by tinnitus-related fear.

RESULTS: Analyses revealed significant associations between catastrophizing and fear and between catastrophizing and increased attention toward the tinnitus. Furthermore, both tinnitus-related catastrophizing and fear were negatively associated with quality of life; moreover, tinnitus-related fear fully mediated the association between catastrophizing about the tinnitus and quality of life.

CONCLUSIONS: The findings confirm earlier suggestions that tinnitus-related concerns and fears are associated with impaired quality of life, which is in line with a cognitive behavioral account of chronic tinnitus. Future research avenues and clinical applications are discussed.


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Department of Laser Therapy and Physiotherapy, Faculty of Health Sciences, Collegium Medicum - Bydgoszcz, Nicolaus Copernicus University, Torun, Poland.

Background: The purpose of our experiment was to determine whether laser stimulation can improve
microcirculation in the posterior regions of the brain in patients with verteobasilar insufficiency (VBI). Material/Methods: We studied 25 patients (20 female, 5 male, mean age 64) diagnosed with chronic VBI. All were evaluated using the De Klyn test, followed by qualitative assessment of stability using a Berg Balance Scale and evaluation of global stability using an electronic balance platform. A CTL-1100 low power laser was used with standard parameters. We established a protocol for laser irradiation at 5 points along the vertebral artery in the cervical region bilaterally. Irradiation was performed 10 times over two weeks.

Results: Significant improvement occurred after therapy in headache (p=0.0005), vertigo (p<0.0000), and tinnitus (p=0.0387). No significant differences were observed in nausea or nystagmus caused by head rotation. The Berg Balance Scale results showed significant differences in almost all features. There was a tendency towards improved stability in all parameters, and statistically significant differences in the total surface of support and the spread surface of support for the left foot.

Conclusions: Laser stimulation as applied in this study can be useful in the treatment of patients with VBI. The main reason for improvement in global stability, balance, and other VBI symptoms is better blood perfusion.

Acceptance and Commitment Therapy versus Tinnitus Retraining Therapy in the treatment of tinnitus: A randomised controlled trial.


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The study compared the effects of Acceptance and Commitment Therapy (ACT) with Tinnitus Retraining Therapy (TRT) on tinnitus impact in a randomised controlled trial. Sixty-four normal hearing subjects with tinnitus were randomised to one of the active treatments or a wait-list control (WLC). The ACT treatment consisted of 10 weekly 60min sessions. The TRT treatment consisted of one 150min session, one 30min follow-up and continued daily use of wearable sound generators for a recommended period of at least 8h/day for 18 months. Assessments were made at baseline, 10 weeks, 6 months and 18 months. At 10 weeks, results showed a superior effect of ACT in comparison with the WLC regarding tinnitus impact (Cohen’s d=1.04), problems with sleep and anxiety. The results were mediated by tinnitus acceptance. A comparison between the active treatments, including all assessment points, revealed significant differences in favour of ACT regarding tinnitus impact (Cohen’s d=0.75) and problems with sleep. At 6 months, reliable improvement on the main outcome measure was found for 54.5% in the ACT condition and 20% in the TRT condition. The results suggest that ACT can reduce tinnitus distress and impact in a group of normal hearing tinnitus patients. Copyright © 2011 Elsevier Ltd. All rights reserved.

IX Somatic Tinnitus

no publications this time
Surgical Treatment

Clinical experience in diagnosis and management of superior semicircular canal dehiscence in children.

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OBJECTIVES/HYPOTHESIS: To identify clinical characteristics of pediatric superior semicircular canal dehiscence (SSCD) and explore suitable options of management.

STUDY DESIGN: Retrospective review.

METHODS: The study comprised 10 patients with auditory and/or vestibular symptoms suspicious for SSCD. One patient pursued care at another institution, and two did not return for follow-up. Subsequently, seven patients (11 ears, 6 females and 1 male, aged 5-11 years) were included. Patients were evaluated using high-resolution temporal bone computed tomography. Those suspected of having SSCD underwent vestibular evoked myogenic potential testing for confirmation in addition to routine audiologic tests.

RESULTS: All seven patients had auditory and/or vestibular impairment. Auditory symptoms included autophony, tinnitus, and conductive or mixed hearing loss. Bone conduction responses were occasionally better than 0 dB HL. Vestibular dysfunction included vertigo, often in response to loud noises, and chronic disequilibrium. One patient underwent surgical repair for disabling vestibular symptoms with dramatic improvement in both auditory and vestibular symptoms postoperatively. The remaining six were closely monitored with routine exams.

CONCLUSIONS: In contrast to adults, children with SSCD usually present with auditory symptoms first, although they share some similarities with adults in clinical manifestations of SSCD. Our study shows that SSCD syndrome, a well-accepted clinical entity, exists in the pediatric population. Conservative management is preferred for children with SSCD; nevertheless, surgical intervention is necessary for those with disabling vestibular symptoms. To date, this is the first clinical case series of symptomatic pediatric patients with SSCD. Copyright © 2011 The American Laryngological, Rhinological, and Otological Society, Inc.

Otologic complications of Q-tip use: One institution’s experience.

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Objective: To evaluate the indications for observation versus surgery in the management of Q-tip induced tympanic membrane perforations (TMP). Study Design: Retrospective cohort study of 1540 patients with a diagnosis of TMP from 2001-2010. Patients with a Q-tip injury were subdivided into two groups: observation or surgery. Methods: Data collected included demographics, symptoms, surgery type, and pre and post-intervention audiometry. Successful outcomes were defined as healed TMP, resolution or improvement of vertigo, tinnitus, or facial nerve paralysis, and/or closure of the air-bone gap (ABG). Results: Fifty-four of 1540 (3.5%) patients who presented with a TMP were secondary to Q-tip use. Four of the 54 patients (7.4%) underwent delayed surgical repair (5 days-5 months) with 100% success. Preoperatively, one patient had a facial nerve paralysis and two had vertigo, both had perilymphatic fistulae. Postoperatively, the facial nerve paralysis resolved and only one patient had persistent dizziness. Fifty of 54 patients opted not to undergo surgery with 35 patients who had follow up. Thirty-four (97%) of the 35 patients who followed up had spontaneous healing. The average size of
the perforation was 19% and average time to perforation closure was 1.75 months. Twelve of 35 patients had no ABG after healing. Two of 35 patients had dizziness immediately after injury with one having persistent dizziness. Conclusion: Observation is an appropriate consideration for patients who have a TMP due to a Q-tip injury. Surgical intervention should be offered early when a perilymphatic fistula is suspected, of if there are significant findings such as the presence of facial paralysis, severe vertigo, or profound sensorineural hearing loss. As otolaryngologists, we should be reluctant to offer surgical intervention of an acute injury without significant symptoms as most patients will heal spontaneously within 2 months.

XI Holistic

no publications this time

XII Review

Tinnitus and hearing loss and changes in hippocampus.
Seminars in Hearing; Volume 32, Issue 2, 2011, Pages 203-211.
Salvi R.a, Langguth B.b, Kraus S.a, Landgrebe, M.b, Allman B.a, Ding D.a, Lobarinas E.a
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Approximately 12 to 14% of adults experience tinnitus and prevalence estimates for tinnitus in children range from 12 to 37% in those with normal hearing and up to 66% with those with hearing loss. Approximately 1% of patients suffer from debilitating tinnitus that requires clinical treatment or intervention. The neural mechanisms responsible for tinnitus, however, remain elusive. Because tinnitus is often associated with cochlear hearing loss, the phantom sound of tinnitus was traditionally believed to originate in the cochlea. More recently, modern brain imaging methods employing positron emission tomography have identified regions in the central auditory pathway (auditory cortex, medial geniculate body) and limbic system (hippocampus) that are activated when patients with somatic tinnitus voluntarily change the loudness of the phantom sound by moving the face, jaw, or upper torso. Somatic tinnitus appears to develop as a function of somatosensory system invasion of the deafferented (deafened) regions of the auditory cortex. Additionally, the involvement of the hippocampus in tinnitus gains further credence from structural imaging studies that reveal a significant decrease in hippocampal gray matter in tinnitus patients. The hippocampus, a structure involved with memory, mood, and spatial navigation, is a major site of neurogenesis in the adult brain. New data suggest that unilateral noise exposure resulting in deafness significantly suppresses the birth of newborn neurons in the hippocampus and leads to memory impairment in noise-exposed animals. Copyright © 2011 by Thieme Medical Publishers, Inc.

XIII Others

Curr Med Chem. 2011 Sep 15. [Epub ahead of print]
Tabuchi K, Nishimura B, Nakamagoe M, Hayashi K, Nakayama M, Hara A.

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Aminoglycosides, cisplatin, and non-steroidal anti-inflammatory drugs (NSAIDs) are widely used pharmacological agents. There is a possibility, however, that the use of these agents may induce transient or permanent hearing loss and tinnitus as side effects. Recent animal studies have clarified
mechanisms leading to the ototoxicity induced by these agents, at least in part. The permanent hearing loss caused by aminoglycosides and cisplatin is suggested to be predominantly associated with the apoptotic death of outer hair cells. Both drugs generate reactive oxygen species (ROS) in the inner ear. ROS can activate cell-death pathways such as the c-Jun N-terminal kinase (JNK) and p38 mitogen-activated protein kinase (MAPK) pathways, which in turn, induce hair cell apoptosis. On the other hand, the abuse of NSAIDs may transiently cause tinnitus and mild to moderate hearing loss. NSAIDs impair the active process of the outer hair cells and affect peripheral and central auditory neurons. Conversely, recent reports clarified that NSAIDs are potential therapeutic agents against cochlear injuries. In this review, recent findings from animal studies regarding the ototoxicity induced by aminoglycosides, cisplatin, and NSAIDs are summarized. Their ototoxic mechanisms are focused on.

XIV Case Reports

Successful Amelioration of Tinnitus in a Stroke Patient by Low-dose Gabapentin.
J Stroke Cerebrovasc Dis. 2011 Sep 7. [Epub ahead of print]

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Bilaterally progressive tinnitus and hearing impairment occurred in a hypertensive patient shortly after an episode of right ganglionic hemorrhage. Audiometric tests showed a mixed sensorineural and conduction hearing loss. When low-dose gabapentin was administrated for the pre-existing postherpetic thoracic neuralgia, the tinnitus dramatically improved but recurred after discontinuation of the drug. Hearing function did not change. In view of a controversy of gabapentin and tinnitus in previous trials, the findings in this patient support that low-dose gabapentin benefits the subgroup of tinnitus patients with secondary contributing factors, such as stroke. Copyright © 2011 National Stroke Association. Published by Elsevier Inc. All rights reserved.

Spontaneous intracranial hypotension without intracranial hypotension.

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A 52-year-old man with a family history of multiple aneurysms presented with the gradual onset of generalized headaches and bilateral sixth nerve palsies. Following intravenous contrast, MRI revealed diffuse pachymeningeal enhancement consistent with spontaneous intracranial hypotension (SIH). Lack of any postural component to the headaches and repeatedly normal opening pressures on lumbar puncture delayed the diagnosis. A cerebrospinal fluid (CSF) leak was not found, but an epidural blood patch led to resolution of symptoms. Although the atypical features of nonorthostatic headache and normal CSF opening pressure have been documented in SIH, and failure to find the site of the leak is not unusual, this case illustrates a confluence of all these findings. An underlying disorder of connective tissue has been linked to SIH, and we propose that decreased meningeal compliance could account for a symptomatic low-volume state of CSF without a low opening pressure.
Hearing loss after noise exposure.

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The higher field strength magnetic resonance imaging (MRI) such as 3 Tesla (T) and above generates noise that has potential detrimental effects on the hearing. Temporary threshold shifts following MRI examination have been reported for MRI with lower field strength. Such effect, however, have not been reported so far for a 3T MRI. We report a case that exemplifies the possible detrimental effects of a 3 T MRI generated noise on the auditory system. Our patient underwent investigation of his chronic backache in a 3 T MRI unit and developed hearing loss and tinnitus post-MRI examination. Hearing assessment was done using pure tone audiogram, distortion product otoacoustic emission (DPOAE) and brainstem electrical response audiometry (BERA) which revealed a unilateral sensorineural hearing loss which recovered within 3 days. However the tinnitus persisted. This is possibly a case of temporary threshold shift following noise exposure. However a sudden sensorineural hearing loss remains the other possibility. Copyright © 2010 Elsevier Ireland Ltd. All rights reserved.

Calcifying pseudoneoplasm of the cerebellopontine angle: case report.

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BACKGROUND AND IMPORTANCE: Calcifying pseudoneoplasms are rare tumors of the neuraxis. To our knowledge, this is only the second reported case in the literature of calcifying pseudoneoplasm of the cerebellopontine angle. The etiology and natural history of these neoplasms are not well understood. This case report provides a thorough review of the histology and potential origins of calcifying pseudoneoplasm.

CLINICAL PRESENTATION: A 34-year-old previously healthy man presented with a 6-month history of progressive worsening headaches, fatigue, tinnitus, dizziness, and blurry vision. Neurological examination was notable for tongue deviation, tongue atrophy, and left uvula deviation. Computed tomography (CT) scanning showed a 3.3 × 3.5 cm densely calcified posterior fossa mass appearing to arise from the occipital bone. Magnetic resonance imaging (MRI) revealed a 4.3 × 2.9 × 2.9 cm left posterior fossa enhancing mass with the margin tip from the left occipital condyle. A transcondylar approach was used to resect the lesion. The mass was found to have eroded through the bone into the foramen magnum. Histopathological examination confirmed the diagnosis of calcifying pseudoneoplasm of the cerebellopontine angle.

CONCLUSION: Calcifying pseudoneoplasms should be considered in the differential diagnosis of calcified cerebellopontine angle tumors. Histopathologic diagnosis is extremely important in the characterization of these lesions in order to direct the course of appropriate management. An inaccurate diagnosis of a malignant tumor can result in potentially harmful and unnecessary therapies, as prognosis for these lesions is generally favorable.
Diffuse thin glomerular basement membrane in association with Fabry disease in a Chinese female patient.

Cai ZY, Zhang YK, Wang SX, Fang QY, Chen YQ.

1Renal Division, Department of Medicine, Peking University First Hospital, Beijing, China.

We report a 41-year-old Chinese female with Fabry disease and diffuse thinning of the glomerular basement membrane (GBM). The patient presented with peripheral edema, mild proteinuria, microscopic hematuria, normal renal function, hypertension and tinnitus. Family screening showed that her daughter had microscopic hematuria, tinnitus and neuropathic pain. Renal biopsy of the proband showed focal segmental glomerulosclerosis with cytoplasmic vacuolization of the glomerular visceral epithelial cells by light microscopy. Laminated myelin inclusions in some of the glomerular podocytes, parietal epithelia, distal tubular epithelial cells and vascular endothelial cells along with diffuse thinning of the GBM (mean thickness of GBM: 216 ± 31 nm) were identified by electron microscopy. Genetic analysis detected a de novo novel GLA mutation, 1208 ins 21 bp, while a new variant of COL4A3 SNP M1209I was carried by mother and daughter as well as the proband’s father (I-1) and one sister (II-4). The coexistence of thinned GBM should be considered in patients with Fabry disease-manifested familial hematuria.

AICA syndrome with facial palsy following vertigo and acute sensorineural hearing loss.
Auris Nasus Larynx. 2011 Aug 20. [Epub ahead of print]

Ikegami-Takada T, Izumikawa M, Doi T, Takada Y, Tomoda K.

Department of Otolaryngology, Kansai Medical University, 2-3-1 Shinmachi, Hirakata, Osaka 573-1191, Japan.

We report a case of infarction of the anterior inferior cerebellar artery (AICA) with peripheral facial palsy following vertigo and acute sensorineural hearing loss. A 39-year-old female presented with vertigo and sudden hearing loss, tinnitus, and aural fullness of the right ear. An audiogram revealed a severe hearing loss at all tested frequencies in the right ear. Spontaneous nystagmus toward the left side was also observed. Otoneurological examinations showed sensorineural hearing loss of the right ear and horizontal and rotatory gaze nystagmus toward the left side, and a caloric reflex test demonstrated canal paresis. Initially, we diagnosed the patient for sudden deafness with vertigo. However, right peripheral facial palsy appeared 2 days later. An eye tracking test (ETT) and optokinetic pattern test (OKP) showed centralis abnormality. The patient’s brain was examined by magnetic resonance imaging (MRI) and magnetic resonance angiogaphy (MRA) and showed an infarction localized in the pons and cerebellum. MRI and MRA revealed infarction of the right cerebellar hemisphere indicating occlusion of the AICA. Consequently, the patient was diagnosed with AICA syndrome but demonstrated regression following steroid and edaravone treatment. We suggest that performing MRI and MRA in the early stage of AICA syndrome is important for distinguishing cerebellar infarction resulting from vestibular disease. Copyright © 2011 Elsevier Ireland Ltd. All rights reserved.

Congenital cholesteatomas.

İşeri M.ª, Ulubil A.ª, Aydin O.ª, Topdag M.ª, Şevik Eliçora S.ª.

ª KBB AD, Kocaeli Üniversitesi Tip Fakültesi, Turkey
ª KBB Bölümü, Kocaeli Devlet Hastanesi, Kocaeli, Turkey

Objective: In this study, congenital cholesteatoma cases that were diagnosed and surgically treated in our clinic are presented and discussed in the light of the current literature. Material and Methods: Clinical records of seven patients (four males and three females, aged between 6 and 49 years), operated for congenital cholesteatoma between 2003 and 2008 were reviewed. None of the cases had a history
of previous surgical intervention or chronic otitis media. All patients were evaluated with audiogram, computerized tomography, and magnetic resonance imaging. Results: Five cases presented with a progressive conductive hearing loss, whereas one patient with tinnitus and another with ear pain. Otoscopic examination showed that tympanic membranes were intact in all cases. In two cases, a white mass causing bulging of the tympanic membrane was seen behind the eardrum. There was a hearing loss in all, but three cases. A canal wall up mastoidectomy was done on two patients, three patients had a modified radical mastoidectomy one patient had a transcanal atticotomy with ossiculoplasty, and one patient had a modified trunsotic approach. Four patients had stage three, two patients had stage four, and one patient had stage two congenital cholesteatomas. Postoperative early complications were not seen in any of the patient. Conclusion: Congenital cholesteatoma can be diagnosed after observation of a white colored mass behind the tympanic membrane either in patients presenting with hearing loss or during routine examination. However, in most patients, this finding cannot be observed. For this reason, especially in young patients with a normal looking tympanic membrane and a conductive hearing loss, the possibility of congenital cholesteatoma should be kept in mind. © 2011 by Türkiye Klinikleri.

XV Specific Forms of Tinnitus

Development of the Jugular Bulb: A Radiologic Study.
Friedmann DR, Eubig J, McGill M, Babb JS, Pramanik BK, Lalwani AK.
Departments of *Otolaryngology, †Radiology, ‡Pediatrics, and §Physiology & Neuroscience, New York University School of Medicine, New York, New York, U.S.A.
OBJECTIVE: Jugular bulb (JB) abnormalities such as JB diverticulum and high-riding JBs of the temporal bone can erode into the inner ear and present with hearing loss, vestibular disturbance, and pulsatile tinnitus. Their cause and potential to progress remain to be studied. This comprehensive radiologic study investigates the postnatal development of the venous system from transverse sinus to internal jugular vein (IJV).
SETTING: Academic medical center. PATIENTS, INTERVENTION, MAIN OUTCOME MEASURE: Measurements of the transverse and sigmoid sinus, the JB, IJV, and carotid artery were made from computed tomographic scans of the neck with intravenous contrast in infants (n = 5), children (n = 13), adults (n = 35), and the elderly (n = 15).
RESULTS: Jugular bulbs were not detected in patients younger than 2 years, enlarged in adulthood, and remained stable in the elderly. The venous system was larger in men than in women. From transverse sinus to IJV, the greatest variation in size was just proximal and distal to the JB with greater symmetry observed as blood returned to the heart. Right-sided venous dominance was most common occurring in 70% to 80% of cases.
CONCLUSION: The JB is a dynamic structure that forms after 2 years, and its size stabilizes in adulthood. The determinants in its exact position and size are multifactorial and may be related to blood flow. Improved understanding of this structure’s development may help to better understand the cause of the high-riding JB and JB diverticulum, both of which may cause clinical symptoms.

The relevance of hypothalamus-pituitary-adrenocortical axis-related hormones to the cochlear symptoms in Ménière's disease.
Int J Audiol. 2011 Sep 15. [Epub ahead of print]
Aoki M, Wakaoka Y, Hayashi H, Nishihori T, Kuze B, Mizuta K, Ito Y.
Department of Otolaryngology, Gifu University Graduate School of Medicine, Gifu City, Japan.
Abstract Objective: To investigate the association of the HPA (hypothalamus-pituitary-adrenocortical) axis-related hormones with the progression of cochlear symptoms in patients with Ménière’s disease. Design: Clinical assessments (Tinnitus Handicap Inventory: THI, visual analog scale to rate the degree
of the tinnitus: VAS, hearing levels in pure-tone audiometry) were conducted upon entry into the study (baseline) and at 12 weeks follow-up (week 12). Blood sampling to measure HPA axis-related hormones took place between 9:00 and 10:00 a.m. at baseline and at 12 weeks follow-up. Study samples: This study consisted of 20 unilateral Ménière’s disease patients and 21 patients with other diseases with unilateral sensorineural hearing loss and tinnitus. Results: A significant deterioration of the hearing level at high frequency range, especially at 2 kHz, was found during the 12 weeks follow-up in the Ménière’s disease group (p < 0.05). The average hearing levels significantly correlated with the serum cortisol level at baseline and week 12 in the Ménière’s disease group, especially regarding the high frequency levels (p < 0.01). Conclusions: Our results suggest that the cortisol levels influence the endolymphatic homeostasis resulting in a deterioration of hearing at high frequency with upstaging of Ménière’s disease.

Spinal cerebrospinal fluid leakage: Clinical features, diagnostic procedures, and treatment.  
[Article in Japanese]  
Equilibrium Research; Volume 70, Issue 3, 2011, Pages 176-188.

Kunihiro T*, Soma K†.

a Department of Otolaryngology, School of Medicine, Keio University, Japan  
b Department of Otolaryngology, Nippon Kokan Hospital, Japan

The most prominent symptom of spinal cerebrospinal fluid (CSF) leakage is an orthostatic, tension-type headache. Other well-known symptoms include nausea, vomiting, photophobia, diplopia, depression, and amnesia. The authors address other commonly encountered symptoms such as dizziness, hearing disturbances, cerebrospinal fluid rhinorrhea, and gustatory and olfactory disturbances. The dizziness experienced in this disorder is essentially characterized as a kind of “floating sensation” or “walking on the clouds” and is associated with a high degree of unsteadiness. A considerable percentage of patients cannot remain standing even when their eyes are open; to-and-fro perturbations are particularly prominent in these patients. Rotatory vertigo attacks can occur in a small portion of patients, but usually only during the early stages of the disease. As with the headache, dizziness is aggravated by an upright or standing position. The weather also influences the intensity of both the headaches and dizziness: both are exacerbated when the atmospheric pressure is low or is falling rapidly. Water intake and/or the drip infusion of a physiological salt solution may temporarily improve dizziness and other symptoms. The usefulness of MRI for diagnosing spinal cerebrospinal fluid leakage is limited. MRI findings are equivocal in most cases; therefore, the authors perform 111In-DTPA scintigraphy for each patient in whom this disorder is suspected. The first choice of treatment for this disorder is bed rest and water intake and/or drip infusion. When these treatments are ineffective, an epidural autologous blood patch is attempted. However, not all patients are cured by this procedure, and dizziness, hearing, and/or tinnitus may worsen after treatment. In some patients, an exploratory tympanotomy is required to rule out associated or treatment-induced perilymphatic fistula. In conclusion, spinal CSF leakage is not a rare disorder, and because this disorder presents with an extremely wide spectrum of symptoms, all physicians in any field of specialization may encounter a patient with this disorder. All physicians should keep this disorder in mind.
Clinical experience in diagnosis and management of superior semicircular canal dehiscence in children.
Lee GS, Zhou G, Poe D, Kenna M, Amin M, Ohlms L, Gopen Q.

Department of Otolaryngology and Communication Enhancement, Children’s Hospital Boston, Boston, Massachusetts, U.S.A; Department of Otology and Laryngology, Harvard Medical School, Boston, Massachusetts, U.S.A. gi.lee@childrens.harvard.edu.

OBJECTIVES/HYPOTHESIS: To identify clinical characteristics of pediatric superior semicircular canal dehiscence (SSCD) and explore suitable options of management.

STUDY DESIGN: Retrospective review.

METHODS: The study comprised 10 patients with auditory and/or vestibular symptoms suspicious for SSCD. One patient pursued care at another institution, and two did not return for follow-up. Subsequently, seven patients (11 ears, 6 females and 1 male, aged 5-11 years) were included. Patients were evaluated using high-resolution temporal bone computed tomography. Those suspected of having SSCD underwent vestibular evoked myogenic potential testing for confirmation in addition to routine audiologic tests.

RESULTS: All seven patients had auditory and/or vestibular impairment. Auditory symptoms included autophony, tinnitus, and conductive or mixed hearing loss. Bone conduction responses were occasionally better than 0 dB HL. Vestibular dysfunction included vertigo, often in response to loud noises, and chronic disequilibrium. One patient underwent surgical repair for disabling vestibular symptoms with dramatic improvement in both auditory and vestibular symptoms postoperatively. The remaining six were closely monitored with routine exams.

CONCLUSIONS: In contrast to adults, children with SSCD usually present with auditory symptoms first, although they share some similarities with adults in clinical manifestations of SSCD. Our study shows that SSCD syndrome, a well-accepted clinical entity, exists in the pediatric population. Conservative management is preferred for children with SSCD; nevertheless, surgical intervention is necessary for those with disabling vestibular symptoms. To date, this is the first clinical case series of symptomatic pediatric patients with SSCD. Copyright © 2011 The American Laryngological, Rhinological, and Otological Society, Inc.

Diuretics in Meniere disease: A therapy or a potential cause of harm?

Pirodda A, Ferri GG, Raimondi MC, Borghi C.

Department of Specialist Surgical and Anaesthesiological Sciences, S. Orsola-Malpighi University Hospital, Via Massarenti 9, 40138 Bologna, Italy.

Despite the lack of clear evidence for their effectiveness in treating vertigo, tinnitus, hearing loss and aural fullness, diuretics, represent a common treatment for Meniere disease (MD), as they are supposed to decrease volume and pressure in the endolymphatic partition of the labyrinth. Our group have outlined the possibility of an adverse effect on inner ear function derived from an abrupt lowering of blood pressure: a subsequent exaggerated vasomotor response inducing local ischemia could be responsible for more or less permanent damage. The inner ear, owing both to its terminal vascular supply and to the necessity of a steady metabolism, seems a reliable target for any hemodynamic imbalance that acutely affect its perfusion. In our opinion, the complexity of the inner ear anatomy and function argues against the usefulness of diuretics to reduce endolymphatic volume, in analogy to their effect on the volemia: too many active mechanisms and „buffer“ systems are involved in the labyrinth. Even considering that the finding of mean low pressure values is relatively common in subjects with MD, an attempt should be to maintain a stable blood perfusion to the labyrinth; in fact, an abrupt decrease in systemic blood pressure can trigger an adverse sympathetic reaction and transmit misleading information to the cochlear vasopressin receptors. Copyright © 2011 Elsevier Ltd. All rights reserved.
Migraine associated vertigo.

[Article in Japanese]

Equilibrium Research; Volume 70, Issue 3, 2011, Pages 172-175.

Murofushi, T.

Department of Otolaryngology, Teikyo University School of Medicine, Mizonokuchi Hospital, Japan

I introduced migraine associated vertigo (MAV) as one of the new clinical entities which might cause vertigo and reviewed my own patients with MAV. While MAV is quite widely accepted in Europe and the USA, it is not familiar in Japan, especially for Japanese otolaryngologists. Although the universal diagnostic criteria of MAV are still under discussion, they should include 1) episodic vertigo attacks, 2) migraine attacks, and 3) an episode of simultaneous existence of vertigo and migraine. In the clinical review, patients (N = 41) were female-dominant (8 men and 33 women), and the mean of their age was 38.2 years. The majority of the patients had rotary vertigo lasting several hours. Some patients had tinnitus and aural fullness. Their tinnitus and aural fullness could be bilateral. Caloric tests and/or vestibular evoked myogenic potentials (VEMP) could be abnormal. Concerning VEMP, some patients showed prolongation of latencies, while some showed absence of responses or shifts of characteristic frequency. These findings suggested that the pathophysiology and lesion sites of MAV could be diverse. At the current stage, establishment of universal diagnostic criteria and treatment guidelines is required.

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Betahistine in the treatment of tinnitus in patients with vestibular disorders.


Ganança MM, Caovilla HH, Gazzola JM, Ganança CF, Ganança FF.

Federal University of São Paulo Paulista School of Medicine.

Betahistine is a medicine used to treat vestibular disorders that has also been used to treat tinnitus.

AIM: To assess the effects of betahistine on tinnitus in patients with vestibular disorders.

MATERIAL AND METHOD: Retrospective data were collected from patient records for individuals presenting with vestibular dysfunction and tinnitus. Patients included had received betahistine 48 mg/day and clinical outcomes were compared with a control group comprising individuals who were unable to receive betahistine due to gastritis, ulcers, pregnancy, asthma or hypersensitivity to the drug. Patients underwent control of any aggravating factors and also standard vestibular exercises as a basis for treatment. The intensity, frequency and duration of tinnitus were assessed on the first day of dosing and after 120 days of treatment. Clinical improvement was defined as a total or partial reduction of tinnitus after treatment.

RESULTS: Clinical improvement was observed in 80/262 (30.5%) of patients treated with betahistine and 43/252 (17.1%) of control patients. Betahistine significantly (p<0.0001) improved tinnitus in treated individuals.

CONCLUSIONS: The daily dosage of 48 mg of betahistine during 120 consecutive days is useful to reduce or eliminate tinnitus in patients with vestibular disorders.
Tinnitus complaint behaviour in long-standing Menière's disorder: its association with the other cardinal symptoms.

Yoshida T, Stephens D, Kentala E, Levo H, Auramo Y, Poe D, Pyykkö I.

Visiting scientist from Department of Otorhinolaryngology, Nagoya University Graduate School of Medicine, Nagoya, Japan Department of Psychological Medicine and Neurology, School of Medicine, Cardiff University, Cardiff, Wales Department of Otorhinolaryngology, Medical School, University of Tampere, Tampere, Finland.

Objective: To explore factors that determine tinnitus complaint behaviour in patients with chronic long-standing Menière's disorder. Design and Setting: A questionnaire-based cross-sectional investigation. This included the Oto-neurological questionnaire, the Hearing Disability and Handicap Scale (HDHS), Hearing Measurement Scale (HMS) on sound localization, and the Dizziness Handicap Questionnaire (DHQ). Participants: Randomly selected 183 members of the Finnish Menière's Federation. Intervention: Postal questionnaire. Main Outcome Measure: International Tinnitus Inventory and impact of tinnitus.

Results: The 183 patients, [36 male 147 female, mean age 63yr] had their Meniere's disorder like symptoms a mean of 18 yrs [range 1-43], 19% of patients ranked tinnitus as their most severe symptom and 10% experienced tinnitus as causing a severe or very severe impact. Regression analysis indicated that 41% of International Tinnitus Inventory variance and 28% of tinnitus impact variance were explained by the cardinal symptoms of Menière's disorder. Furthermore 40% of International Tinnitus Inventory and 25% of tinnitus impact variance were explained by symptom related disabilities (HDHS, HMS, and DHQ). Aural pressure, hearing loss and gait problems were the most important predictors of tinnitus complaint. Understanding what people say and limitation of activities due to vertigo were the most important related disabilities. Conclusion: Tinnitus shares a significant variance with the other cardinal symptoms in patients with long-standing Menière’s disorder. As the impact is significantly related to activity limitations based on hearing disability and vertigo, the results suggest that therapeutic efforts to reduce tinnitus in Menière’s disorder should include the alleviation of balance and hearing problems. © 2011 Blackwell Publishing Ltd.

Early and long-term results of the treatment of jugular paragangliomas using different ranges of surgical approach.


dr hab. n. med. Piotr Ładziński, Katedra i Oddzia³ Kliniczny Neurochirurgii, OEI'ski Uniwersytet Medyczny w Katowicach, Wojewódzki Szpital Specjalistyczny nr 5 im. oew. Barbary, Pl. Medyków 1, 41-200 Sosnowiec, phone: +48 32 368 20 24, fax: +48 32 368 25 50, e-mail: sekr_nch@wss5.pl.

Background and purpose: The applied approach to the jugular foramen is a combination of the juxtacondylar approach with the subtemporal fossa approach type A. The purpose of this study is to present our results of treatment of jugular paragangliomas using the aforementioned approach. Material and methods: Twenty-one patients (15 women, 6 men) with jugular paragangliomas were included in the study. The neurological status of the patients was assessed before and after surgery as well as at the conclusion of treatment. The approximate volume of the tumour, its relation to large blood vessels, cranial nerves and brainstem, as well as consistency and vascularity were also assessed. Results: The duration of symptoms ranged from 3 to 74 months. In 86% of patients hearing loss was the predominant symptom. The less frequent symptoms included pulsatile tinnitus in the head, dysphagia and dizziness. Approximate volume of the tumours ranged from 2 to 109 cm³. A gross total resection was achieved in 71.5% of patients. The postoperative performance status improved in 38% of patients, did not change in 38% and deteriorated in 24% of patients. Conclusions: A proper selection of the range of the approach to jugular foramen paragangliomas based on their topography and volume reduces perioperative injury without negative consequences for the radicality of the resection.
Clinical Trials

Source: www.clinicaltrials.gov (20th September 2011)

Acoustic Coordinated Reset (CR®) Neuromodulation for the Treatment of Chronic Tinnitus (“RESET Real Life”) (RRL)

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<td>Change of tinnitus severity, measured by TBF-12 Score or CGI score change from baseline to end of treatment.</td>
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<td>Alteration of tinnitus [ Time Frame: 0.5,1,2,3,6,9,12 months ] [ Designated as safety issue: No ]</td>
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<td>Early alteration of tinnitus frequency and psychometric tinnitus loudness, measured with the ANM T30 CR®-System.</td>
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<td>Audiogram for hearing loss change [ Time Frame: 3,12 months ] [Designated as safety issue: No ]</td>
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| Brief Summary | Confirmation of efficacy and safety of acoustic CR®-neuromodulation for the treatment of chronic tinnitus patients using the CE marked ANM T30 CR®-system in a real life outpatient setting.  
  - Identification of early indicators for therapy success  
  - Comparison of different patient groups regarding: tinnitus severity, tinnitus duration, level of hearing loss, stimulation patterns, unilateral monotonal vs. all other complex forms  
  - Representative set of safety data in a broad patient spectrum  
  - Measurement of tinnitus burden (TBF-12 Questionnaire)  
  - Generation of longterm compliance data |
| Detailed Description | Study Phase | Phase IV |
| Study Type | Interventional |
| Study Design | Allocation: Non-Randomized  
  Endpoint Classification: Safety/Efficacy Study  
  Intervention Model: Single Group Assignment  
  Masking: Open Label  
  Primary Purpose: Treatment |
| Condition | Tinnitus |
| Intervention | Device: ANM T30 CR®-System  
  Stimulation for 4-6h/day for a time of 1 year  
  Other Name: ANM T30 CR®-System |
| Study Arms / Comparison Groups | standard: Experimental  
  Standard treatment with the ANM T30 CR®-System  
  Intervention: Device: ANM T30 CR®-System |
| Recruitment Information | Recruitment Status | Not yet recruiting |
| Estimated Enrollment | 200 |
| Estimated Completion Date | July 2013 |
| Eligibility Criteria | Main Inclusion Criteria:  
| | • symptomatic chronical (>3 months) subjective tinnitus  
| | • <60 dB hearing loss  
| | • men and women ≥18 years old  
| Main Exclusion Criteria: | • serious neurologic  
| | • psychiatric or internistic disease  
| | • objective tinnitus  
| | • Morbus Menière  
| | • craniomandibular triggered tinnitus  
| Gender | Both  
| Ages | 18 Years and older  
| Accepts Healthy Volunteers | No  
| Locations | Dr. med. Tatjana von Stackelberg  
| | Meerbusch, Germany, 40667  
| | Dr. med Uwe Brinkmann  
| | Oelde, Germany, 59302  
| | Hospital of the University of Regensburg  
| | Regensburg, Germany, 93053  
| Location Countries | Germany  
| Administrative Information |  
| NCT ID | NCT01435317  
| Other Study ID Numbers | NCT2011-08-26  
| Responsible Party | ANM Adaptive Neuromodulation GmbH  
| Study Sponsor | ANM Adaptive Neuromodulation GmbH  
| Collaborators | Ceres GmbH evaluation & research  
| Investigators | Principal Investigator: Berthold Langguth, Dr. Hospital of the University of Regensburg  
| Information Provided By | ANM Adaptive Neuromodulation GmbH  
| Verification Date | September 2011  
| Health Authority | Germany: Federal Institute for Drugs and Medical Devices  

## Tracking Information

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| Current Primary Outcome Measures | To evaluate the effectiveness of the Inhibitor™ Tinnitus Masking Device [ Time Frame: Single visit (day 1), assessed at time of visit ] [ Designated as safety issue: No ]

The Inhibitor™ Tinnitus Masking Device will be demonstrated for a duration of 60 seconds and may be demonstrated up to 5 times on individuals presenting with tinnitus to evaluate any changes in tinnitus perception. Duration and degree of change will be recorded for each presentation of the device.

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| Current Secondary Outcome Measures | Genetic Sample to look for particular genetic expression. [ Time Frame: Single visit (day 1), evaluated at the time of the genetic collection. ] [ Designated as safety issue: No ]

Individuals with and without (to serve as controls) may provide a genetic sample (via blood, buccal swab or saliva) to determine presence of SCN9 gene expression. This genetic expression is associated with chronic pain. Since chronic pain and tinnitus are similar, we are trying to determine if there is a higher incident of expression of the SCN9 gene in those subjects with disturbing tinnitus than subjects that are not disturbed by tinnitus. Those without tinnitus will serve as controls.

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## Descriptive Information

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<th>Brief Title</th>
<th>Inhibitor Masking Device &amp; SCN9 Gene Expression</th>
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<td>Official Title</td>
<td>Clinical Evaluation of the Inhibitor Tinnitus Treatment Masking Device &amp; SCN9 Gene Expression</td>
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<td>Brief Summary</td>
<td>To evaluate the effectiveness of the Inhibitor™ Tinnitus Masking Device. To determine if there is a higher incident of expression of the SCN9 gene in those subjects with disturbing tinnitus than subjects that are not disturbed by tinnitus.</td>
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Detailed Description | Up to 50 million Americans have tinnitus on a regular basis with between 2-3 million suffering from tinnitus where it affects daily living. The Inhibitor™ Tinnitus Masking Device is a new tinnitus treatment device recently available in the United States for use of temporary relief of tinnitus. The device emits an ultra high frequency sound for 60 seconds via bone conduction when applied to the mastoid. Patients reporting tinnitus will be provided the opportunity to demonstrate the device to observe any changes in their tinnitus. The device may be demonstrated up to 5 times. The investigators will be recording the degree and duration of change in tinnitus perception following treatment with the Inhibitor™ Tinnitus Masking Device. Patients may provide a genetic sample (typically via saliva sample) to look for expression of a particular genetic marker that may be associated with tinnitus. The investigators will collect samples from both people with tinnitus and those without tinnitus to use as a control.

Study Phase

Study Type | Interventional

Study Design | Allocation: Non-Randomized
Endpoint Classification: Efficacy Study
Intervention Model: Single Group Assignment
Masking: Single Blind (Subject)
Primary Purpose: Treatment

Condition | Tinnitus

Intervention | Device: The Inhibitor™ Tinnitus Masking Device

Other Name: The Inhibitor™ Tinnitus Masking Device

Study Arms / Comparison Groups

- Tinnitus: Experimental
  - Individual with tinnitus.
  - Intervention: Device: The Inhibitor™ Tinnitus Masking Device
- No tinnitus: No Intervention
  - Individuals without tinnitus.

Additional information

Publications*

* Includes publications given by the data provider as well as publications identified by National Clinical Trials Identifier (NCT ID) in Medline.


Recruitment Information

Recruitment Status | Not yet recruiting

Estimated Enrollment | 500
<table>
<thead>
<tr>
<th>Estimated Completion Date</th>
<th>December 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated Primary Completion Date</td>
<td>September 2016  (final data collection date for primary outcome measure)</td>
</tr>
</tbody>
</table>
| Eligibility Criteria | Inclusion Criteria:  
  - over 18 years,  
  - has tinnitus  
Exclusion Criteria:  
  - Pacemaker,  
  - pregnancy,  
  - metal implants in head or neck,  
  - thrombosis, migraines/headaches,  
  - metal bonded retainer, surgeries within the last 6 months which patient is still recovering from,  
  - any medical reason your physician would advise against the use of this device,  
  - under 18 years |
| Gender | Both |
| Ages | 18 Years and older |
| Accepts Healthy Volunteers | Yes |
| Contacts | Contact: David R Friedland, MD, Ph.D. 414-805-5625 dfriedland@mcw.edu  
Contact: Marcia L Dewey, Au.D. 4148-5-5680 mdewey@mcw.edu |
| Location Countries | |
| Administrative Information | |
| NCT ID | NCT01412918 |
| Other Study ID Numbers | PRO00014763 |
| Responsible Party | David Friedland, Medical College of Wisconsin |
| Study Sponsor | Medical College of Wisconsin |
| Investigators | Principal Investigator: David R Friedland, MD, Ph.D. Medical College of Wisconsin |
| Information Provided By | Medical College of Wisconsin |
| Verification Date | May 2011 |
| Health Authority | United States: Institutional Review Board |