TRI NEWSLETTER

2008 / Number 7

"YES WE CAN"

Looking back on what has been achieved during the last 12 months, we see a large number of high quality work, which has substantially increased our knowledge about tinnitus characteristics, mechanisms and effects on patients. So we have good reason to be confident that better treatment options and even a cure for tinnitus can be reached in the near future. However we are well aware that further effort is necessary to reach our common objective as soon as possible. Basic scientists and clinicians, senior experts and young researchers from different disciplines and different countries must be able to exchange and collaborate in a productive manner.

At TRI we try to create such an environment, as a whole but also through dedicated workgroups. These 7 groups, each focusing on a specific thematic (Neuromodulation, Pharmacology, Auditory and Somatosensory Modulation, Tinnitus Subtyping and Clinics, Nutritional Balance) are fully operational. If you are interested in their work and in cooperating, you can find further information and contact details on our website. Another opportunity would be to join us at the 3rd Tinnitus Research Initiative Meeting 2009 that will take place on June 24th - 26th, 2009 in Stresa/Italy (www.tri2009.com), the only international tinnitus meeting for next year. A great opportunity to present your latest work through a poster or a symposium.

Finally TRI would like to thank all people involved in its organization, the grantees, everyone who applied for our help and other colleagues and friends who contacted and helped us. 2008 has been a great year, thanks to your involvement. May 2009 bring you happiness, joy and success as well as to your relatives and friends. Let's fight together for a cure!

Berthold Langguth Benjamin Questier Susanne Staudinger

3rd Tinnitus Research Initiative Meeting

From Clinical Practice to Basic Neuroscience and back

An international conference on Tinnitus

June 24th - 26th, 2009, Stresa, Italy

Conference Program

Clinical Management of Tinnitus
Physiology & Anatomy
Sound Therapy
Hearing Aids
Cortical and Brain Stimulation
Imaging, Neurofeedback
Diagnosis

Basic Neuroscience
Genetics, Pharmacology
Auditory Training
Electrical stimulation of the cochlea
Somatosensory Modulation
Nutrition and Diet
Tinnitus Subtyping
etc....

Invited Speakers

Matteo de Nora (Principality of Monaco)
Luca Del Bo (Italy)
Ana Belén Elgoyhen (Argentina)
Ron Goodey (New Zealand)
Berthold Langguth (Germany)
Alessandro Martini (Italy)
Aage Møller (USA)
Larry Roberts (Canada)
Tanit Sanchez (Brasil)
Richard Tyler (USA)

Dirk De Ridder (Belgium)
Jos Eggermont (Canada)
Herta Flor (Germany)
Pawel Jastreboff (USA)
Ed Lobarinas (USA)
Jennifer Melcher (USA)
Arnaud Norena (France)
Richard Salvi (USA)
Grant Searchfield (New Zealand)
Nathan Weisz (Germany)

Poster Sessions and Free talks

Submit an abstract for the opportunity to show your latest research to an international audience by presenting a poster or giving a talk. Abstract submissions for symposia are welcome, too!
Limited podium presentation

Important deadlines

abstract submission	**January 31st, 2009**
early registration	**February 28th, 2009**

A pre-conference in italian language will take place on June 23rd, 2009. Italian formation credits (ECM) will be provided.

For more information about this meeting please visit the website www.tri2009.com or contact the

Organizing office:
Fondazione Ascolta e Vivi,
Via V. Foppa, 15, 20144 Milan, Italy
phone 0039 02 7200 18 24
e-mail info@faev.org

Scientific office:
Tinnitus Research Initiative, Link Research & Grant Corp
Universitaetsstrasse 84, 93053 Regensburg, Germany
phone 0049 941 941 2096, fax 0049 941 941 2025
e-mail info@tinnitusresearch.org

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NEWS

Tanit Sanchez was awarded as the president of the X International Tinnitus Seminar, to be hold in Aracaju, Brasil, 2011.

Upcoming Meetings Meetings exclusively dedicated to Tinnitus are marked red

February 2009

32nd MidWinter Meeting of the Association for Research in Otolaryngology (ARO)

When: **February 14 – 19, 2009**
Where: **Marriot Waterfront Hotel, Baltimore, MD, USA**
Contact: Alex Springer
E-Mail: aspringer@talley.com
Detailed information: http://www.aro.org/mwm/mwm.html

March 2009

American Auditory Society, Annual Meeting

When: **March 5 – 7, 2009**
Where: **Scottsdale, AZ, USA**
Contact: American Auditory Society
Detailed information: http://www.amauditorysoc.org/annual-meeting/reginfo.htm

12. Jahrestagung der Deutschen Gesellschaft für Audiologie e.V.

When: **March 11 – 14, 2009**
Where: **Innsbruck, Austria**
Contact: Dt. Gesellschaft für Audioglogie e.V. Geschäftsstelle
c/o Haus des Hörens
Marie-Curie-Str. 2
26129 Oldenburg
Phone: 0049 (0)4 41/2172-500
Fax: 0049 (0)4 41/2172-550
E-Mail: info@dga-ev.com
Detailed information: http://www.dga-ev.com

Internationale Konferenz für Akustik NAG/DAGA 2009

When: **March 23 – 26, 2009**
Where: **Rotterdam, NL**
Contact: NAG-DAGA 2009 Conference secretariat
P.O. Box 66
6585 ZH Mook
The Netherlands
Detailed information: http://www.nag-daga.nl/index.html

8th Göttingen Meeting of the German Neuroscience Society

When: **March 25 – 29, 2009**
Where: **Göttingen, Germany**
Contact: Dt. Gesellschaft für Audioglogie e.V. Geschäftsstelle
Geschäftsstelle der Neurowissenschaftlichen Gesellschaft e.V.
Meino Gibson / Annika Buchheister
Max Delbrück Center for Molecular Medicine (MDC), Berlin-Buch
Robert- Rössle- Str. 10
13092 Berlin, Germany
Phone: 0049 (0) 30 9406 3336
Fax: 0049 (0) 30 9406 3819
E-Mail: gibson@mdc-berlin.de or
a.buchheister@mdc-berlin.de
Detailed information: http://www.nwg-gottingen.de/2009/

April 2009

AudiologyNOW! 2009

When: **April 1 – 4, 2009**
Where: **Dallas Convention Center, Dallas TX, USA**
Contact: Brittany Kuntz
E-Mail: bkuntz@audiology.org
Detailed information: http://www.audiologynow.org

May 2009

The 27th European Course on The Management of Tinnitus and Hyperacusis

When: **May 10 – 13, 2009**
Where: **Møller Centre, University of Cambridge**
Contact: Ann Allen, British Society of Audiology
80 Brighton Road, Reading, RG6 1PS, UK
Phone: 0044 (0)118 966 0622
E-Mail: ann@thebsa.org.uk
Detailed information: http://www.europeantinnituscourse.org

157th Meeting of the Acoustical Society of America (ASA)

When: **May 18 – 22, 2009**
Where: **Portland, Oregon, USA**
E-Mail: asa@aip.org
Detailed information: http://www.asa.aip.org/meetings.html

IFOS 2009 – XIX World Congress of Oto-Rhino-Laryngology

When: **June 1 – 5, 2009**
Where: **São Paulo ANHEMBI Convention Center, São Paulo, Brazil**
E-Mail: info@ifosssaopaulo2009.com.br
Detailed information: http://www.ifossaopaulo2009.com.br

XXI IERASG - XXI Biennial Symposium of the International Evoked Response Audiometry Study Group

When: **June 7 – 11, 2009**
Where: **Windsor Barra Hotel, Rio de Janeiro, Brazil**
Detailed information: http://www.ierasg2009.org/

Human Brain Mapping

When: **June 7 – 11, 2009**
Where: **Windsor Barra Hotel, Rio de Janeiro, Brazil**
Detailed information: http://www.ierasg2009.org/

Nineteenth Meeting of the European Neurological Society

When: **June 20 – 24, 2009**
Where: **Fiera Milano Congress Centre, Milan, Italy**
Contact: ENS 2009
c/o AKM Congress Service
Association House
P.O. Box
CH-4002 Basel / Switzerland
Phone: 0041 61 686 77 11
Fax: 0041 61 686 77 88
E-Mail: info@akm.ch
Detailed information: http://www.ensinfo.org

9th EFAS Congress

When: **June 21 – 24, 2009**
Where: **Tenerife, Canary Islands, Spain**
Contact: Magna Congresos
Ctra. Gral. Santa Cruz Laguna nº293 Edif. Cristina 2ºA
38320 La Cuesta - La Laguna - S/C de Tenerife
Canary Islands - Spain
Phone: 0034 922 656 262
Fax: 0034 922 670 188
E-Mail: congresos@magnacongresos.com
Detailed information: http://www.efas2009.org

3rd Tinnitus Research Initiative Meeting – From Clinical Practice to Basic Neuroscience and back. An international conference on Tinnitus

When: **June 24 – 26, 2009**
Where: **Stresa, Italy**
Contact: Organizing Office: Fondazione Ascolta e Vivi, Via V. Foppa
20144 Milan, Italy
Phone: 0039 0 2 72001824
E-Mail: info@faev.org
Detailed information: http://www.tri2009.org

MEMRO 2009 - Middle-Ear Mechanics in Research and Otology. 5th International Symposium

When: **June 24 – 28, 2009**
Where: **Stanford University, CA, USA**
Contact: Kam Morrella, CMP
Manager, Events & Meeting Planning
Stanford Conference Services
123 Encina Commons
Stanford, CA 94305
Phone: 001 650-736-0048
E-Mail: kamm@stanford.edu
Detailed information: http://www.memro.org

July 2009

Conference on Implantable Auditory Prostheses

When: **July 12 – 17, 2009**
Where: **Granlibakken Conference Center**
Lake Tahoe, California
Contact: John Middlebrooks, Chair
Kresge Hearing Research Institute
University of Michigan
E-Mail: jmidd@umich.edu
Detailed information: http://www.hei.org/ciap/index.html

September 2009

27th Politzer Society Meeting

When: **September 3 – 5, 2009**
Where: **The Queen Elisabeth II Conference Centre, London, UK**
Contact: Sterling Events Ltd, 62 Hope Street
Liverpool L1 9BZ UK
Phone: 0044 (0) 151 709 8979
Fax: 0044 (0) 151 708 9861
Detailed information: http://www.politzerlondon.com

9th International Conference on Theoretical and Computational Acoustics 2009

When: **September 7 – 11, 2009**
Where: **Dresden, Germany**
Contact: Dr. Steffen Marburg
c/o Inst. für Festkörpermechanik
Technische Universitaet Dresden
01062 Dresden, Germany
Phone: 0049 351 4633 7976
Fax: 0049 351 4633 7969
E-Mail: info@ictca2009.com
Detailed information: http://www.wc2009.org/world-congress-2009/Pages/Home.aspx

Medical Physics and Biomedical Engineering World Congress 2009

When: **September 7 – 12, 2009**
Where: **ICM, International Congress Center Munich, Germany**
Contact: JVDE CONFERENCE SERVICES
Stresemannallee 15
60596 Frankfurt am Main, Germany
Phone: 0049 (0)69 - 63 08-229/ -477
Fax: 0049 (0)69 - 96 31-52 13
E-Mail: wc2009@vde.com
Detailed information: http://www.wc2009.org/world-congress-2009/Pages/Home.aspx

Tinnitus Discovery - Asia & Pacific Tinnitus Symposium

When: **September 11 – 12, 2009**
Where: **Auckland Maritime Museum, New Zealand**
E-Mail: tinnitus@auckland.ac.nz
Detailed information: http://www.fmhs.auckland.ac.nz/soph/depts/audiology/ofhec.aspx

October 2009

American Academy of Otolaryngology, Head and Neck Surgery Annual Meeting

When: **October 4 – 7, 2009**
Where: **San Diego, CA, USA**
Detailed information: http://www.entnet.org

10th Anniversary Leicester Balance Course 13th to 15th October

When: **October 13 - 15, 2009**
Where: **Leceister Tigers Rugby Stadium, Leceister, UK**
phone: 0044 (0)845 226622
E-Mail: emma@biosensemedical.com

The 7th Meeting of the British Society of Neuro-Otology

When: **October, 16, 2009**
Where: **Leceister Tigers Rugby Stadium, Leceister, UK**
Contact: Miss J Mills
Neuro-Otology Group
Imperial College London, Charing Cross Hospital
Fulham Palace Road London W6 8RF
phone: 0044 (0)208 846 7285
Fax: 0044 (0)208 846 7577
E-Mail: neuro-otology@imperial.ac.uk
Detailed information: http://www.bsno.org.uk/Oct16-09-meeting.html

54th International Congress of Hearing Aid Acousticians

When: **October 21 – 23, 2009**
Where: **CongressCenter Nürnberg, Germany**
Detailed information: http://www.euha.org

158th Meeting of the Acoustical Society of America

When: **October 26 – 30, 2009**
Where: **San Antonio, Texas, USA**
E-Mail: asa@aip.org
Detailed information: http://www.asa.aip.org/meetings.html

November 2009

ASHA Convention 2009 - American Speach-Hearing-Language Association

When: **November 19 – 21, 2009**
Where: **New Orleans, Lousiana, USA**
Detailed information: http://www.asha.org/about/events/convention

December 2009

The 7th Asia Pacific Symposium on Cochlear Implants and related Sciences (APSCI)

When: **December 1 – 4, 2009**
Where: **Raffles City Convention Center, Singapore**
Contact: APSCI 2009 Symposium Manager
73 Bukit Timah Road
Rex House, #03-01
Phone: 0065 6330 6730
Fax: 0065 6336 2123
E-Mail: apsci2009@pwevent.com
Detailed information: http://www.apsci2009.com.sg

Recently published literature (articles of authors who are funded by TRI are marked in blue)

I Epidemiology

Tinnitus and hearing loss in 15-16-year-old students: Mental health symptoms, substance use, and exposure in school.

Int J Audiol. 2008 Nov;47(11):688-94.

Brunnberg E, Linden-Bostrom M, Berglund M
Orebro University, Sweden.

The current study assessed the responses from a survey titled ‚Life and Health - Young People 2005', completed by 2878 15-16-year-old adolescents in mainstream schools in the county of Orebro, Sweden. Thirty-nine percent of students with hearing loss (slight, mild, or moderate) and 6% of students with normal hearing reported tinnitus often or always during the past three months. Almost no gender difference was observed among students with normal-hearing reporting tinnitus (boys 6.3%, girls 5.6%); however, a gender difference was noticed among hard-of-hearing (HH) students (boys 50%, girls 28%). Adolescents with both hearing loss and tinnitus reported considerably higher scores for mental health symptoms, substance use, and school problems than other students. Anxiety in the past three months, male gender, and alcohol consumption in the past year were associated with tinnitus in HH students; irritation and anxiety in the past three months, disability, use of illicit drugs, and truancy predicted tinnitus in the normal-hearing group. Consequently, students with a hearing loss and tinnitus are at high risk and should be monitored for subsequent problems.

Otologic and audiologic lesions due to blast injury.

J Basic Clin Physiol Pharmacol. 2008;19(3-4):185-191.

Nageris BI, Attias J, Shemesh R
Department of Otolaryngology, Head and Neck Surgery, Rabin Medical Center, Petah Tiqwa, Israel. bennyn@clalit.org.il

AIM: To evaluate the effect of blast injury on the otologic and hearing state over time. SETTING: Otology unit of a tertiary referral center. METHODS: Seventy-three patients aged 16 to 73 years who sustained physical trauma from an explosion underwent otologic and audiologic examination 3-4 months and one year later. RESULTS: At the first examination, high-frequency sensorineural hearing loss was detected in 57 patients (78%), mixed hearing loss in 13 (19%), and low-tone conductive hearing loss in two (3%). Conductive hearing loss had improved by one year, while the cochlear hearing loss, in most cases, did not. Only 7% of the patients with tinnitus reported improvement after one year. CONCLUSIONS: The permanent otologic damage caused by blast injury cannot be determined before one year after the traumatic event.

[Tinnitus in young patients up to 35-years old]

[Article in Polish]
Otolaryngol Pol. 2008;62(4):476-479.

Raj-Koziak D, Bartnik G, Skarzyński H, Piłka A, Fabijańska A, Borawska B
Instytut Fizjologii i Patologii Słuchu, Klinika Szumów Usznych.

According to our observations tinnitus is becoming increasingly common amongst younger persons. About 25% of patients registered in our Tinnitus Clinic, are below the age of 35. Group of 235 tinnitus patients ranging in age from 18 to 35 years old were evaluated for this study. There were no other pre-selection criteria except the age. All of the patients answered the questions concerned with the cause of tinnitus. The results of our research indicate that infections (68.5%), noise exposure (27.7%) and stress (23.4%) are the most frequent cause of tinnitus among patients below 35 years.

Inner ear problems of Thai priest at Priest Hospital.

J Med Assoc Thai. 2008;91 Suppl 1:S63-67.

Karnchanakas T, Tantanavat A, Sinsakontavat J
Department of Ear Nose Throat, Priest Hospital, Bangkok, Thailand. tweporn@yahoo.com

BACKGROUND: The inner ear problems of Thai priest at Priest Hospital had never been reported previously, so Department of Ear Nose Throat try to correlate the metebotic disorder with inner ear problems. OBJECTIVES: 1) To study the fasting blood sugar (FBS), total cholesterol (T. Chol), low density lipoprotein (LDL), and triglyceride (TG), the factors expected to involve in inner ear problems of priests at Priest Hospital. 2) To compare the FBS, T. Chol, HDL, LDL, and TG of priests with inner ear problems at Priest Hospital. 3) To find the percentage of abnormal from FBS, T. Chol, LDL, and TG. MATERIAL AND METHOD: The study using 83 sampling of priests with inner ear problems and 107 priests as a controlled group. The research instruments used to collect data was the questionnaire which composed of general information, physical, ear-nose-throat and neurological examination, pure tone audiometry, brainstem evoke response audiometry (BERA) and the blood tests:FBS, T. Chol, TG, and LDL. The inner ear problems were composed of: 1) Dizziness 2) Hearing Loss 3) Tinnitus Aurium. The descriptive statistics were used to analyze the data from questionnaires and utilized frequency, percentage, standard deviation (S.D.) and t-test to achieve desired results. RESULTS: Priest at middle age and elderly with inner ear problems had greater FBS and TG than expected values of the control group. CONCLUSION: The middle age and elderly priests who had greater FBS and TG than expected values were sick with inner ear problems that causing dizziness, hearing loss and tinnitus aurium.

Tinnitus with or without hearing loss: Are its characteristics different?

European Archives of Oto-Rhino-Laryngology. Nov 2008 265(11):1295-1300.

Savastano M
Department of Medical-Surgical Specialities, ENT Section, University of Padova, Via Giustiniani 2, 35128 Padova, Italy

The present study was carried out in order to analyze the clinical characteristics of tinnitus both in normal hearing subjects and in patients with hearing loss. The study considered 520 consecutive tinnitus sufferers. The following parameters were considered: age, sex, subjective disturbance caused by tinnitus, subjective judgment of tinnitus intensity, tinnitus laterality, tinnitus duration, tinnitus measurements, normal hearing or associated hearing loss. Among the patients considered, 223 have normal hearing while 297 have a hearing deficit. The hearing impairment was found to be in most cases of sensorineural type. The subjective discomfort is higher in presence of hearing loss. Subjects with hearing loss needed significantly higher masking levels. No evident differences in the residual inhibition (RI) result between the two groups were found. The present study confirms that tinnitus is most frequently associated with hearing loss. The characteristics of tinnitus in normal hearing subjects, except for the subjective judgment of tinnitus intensity, the pitch and the RI, are significantly different for those observed in subjects with hearing loss. The association of tinnitus and hearing deficit seems to increase the perceived severity of the symptom. © 2008 Springer-Verlag.

II Pathophysiology

Using auditory steady state responses to outline the functional connectivity in the tinnitus brain.

PLoS ONE. 2008;3(11):e3720. Epub 2008 Nov 13.

Schlee W, Weisz N, Bertrand O, Hartmann T, Elbert T
Department of Psychology, University of Konstanz, Germany. Winfried.Schlee@uni-konstanz.de

BACKGROUND: Tinnitus is an auditory phantom perception that is most likely generated in the central nervous system. Most of the tinnitus research has concentrated on the auditory system. However, it was suggested recently that also non-auditory structures are involved in a global network that encodes subjective tinnitus. We tested this assumption using auditory steady state responses to entrain the tinnitus network and investigated long-range functional connectivity across various non-auditory brain regions. METHODS AND FINDINGS: Using whole-head magnetoencephalography we investigated cortical connectivity by means of phase synchronization in tinnitus subjects and healthy controls. We found evidence for a deviating pattern of long-range functional connectivity in tinnitus that was strongly correlated with individual ratings of the tinnitus percept. Phase couplings between the anterior cingulum and the right frontal lobe and phase couplings between the anterior cingulum and the right parietal lobe showed significant condition x group interactions and were correlated with the individual tinnitus distress ratings only in the tinnitus condition and not in the control conditions. CONCLUSIONS: To the best of our knowledge this is the first study that demonstrates existence of a global tinnitus network of long-range cortical connections outside the central auditory system. This result extends the current knowledge of how tinnitus is generated in the brain. We propose that this global extend of the tinnitus network is crucial for the continuos perception of the tinnitus tone and a therapeutical intervention that is able to change this network should result in relief of tinnitus.

Role of auditory cortex in noise and drug-induced tinnitus.

Am J Audiol. 2008 Oct 31.

Eggermont JJ
Departments of Physiology and Biophysics, and Psychology, University of Calgary, Calgary, Alberta, Canada.

PURPOSE: To elucidate the role of auditory cortex in tinnitus. METHOD: Review of neurophysiological findings in cat auditory cortex following noise trauma or the application of salicylate and quinine, all expected to induce tinnitus. Place those findings in the context of what is expected from studies in humans. This provides a good context for interpreting the animal data in terms of what is happening in the brains of people with tinnitus. RESULTS: Tinnitus is an auditory percept to which several central structures in the auditory system may contribute. Because the central auditory system has both feed forward connections and feed back connections it can be described as a set of nested loops. Once these loops become activated in a pathological fashion, as they may be in tinnitus, it becomes hard to assign importance to each contributing structure. Strongly interconnected networks, i.e., neural assemblies, may be determining the quality of the tinnitus percept. CONCLUSION: It is unlikely that tinnitus is the expression of a set of independently firing neurons, and more likely that it is the result of a pathologically increased synchrony between sets of neurons. There is clear evidence for this from both evoked potentials and from neuron-pair synchrony measures.

Inner ear dysfunction of uncertain origin: A multidisciplinary approach could give something more.

Med Hypotheses. 2008 Nov 20.

Pirodda A, Brandolini C, Ferri GG, Modugno GC, Esposti DD, Borghi C
Department of Specialistic Surgical and Anaesthesiological Sciences, University of Bologna, Via Massarenti n.9, 40138 Bologna, Italy.

In order to find out any possible cause of an alteration of the vasomotor reactivity which can be responsible for a more or less severe sufferance of the inner ear, announced by the onset or the enhancement of sensorineural hearing loss, tinnitus, and some kind of dizziness and vertigo, a multidisciplinary approach should be considered. The possibility of an influence of hemodynamic imbalance due to hypotensive changes followed by vasomotor changes affecting the microcirculation of the inner ear has already been widely discussed; moreover, an increase in prevalence of tinnitus (which in many cases can be considered as a symptom of sufferance of the inner ear) has been found in subjects submitted to an “aggressive” antihypertensive therapy as well as in patients with severe heart failure, thus demonstrating a relationship between hemodynamic changes and inner ear dysfunction. For the same reason, the research for this mechanism of imbalance could concern other conditions possibly activating an abnormal response of the autonomic nervous system, which could in turn lead to a circulatory impairment of the labyrinth: among these, affections concerning central nervous system, endocrine system, metabolism, renal apparatus and even gastroenteric diseases with a functional component and any other factor which could interfere with vasomotor regulation should be considered. Thus, the absence of reliable causes for a sufferance of the inner ear should not lead to catalogue it as a disorder of “idiopathic” nature, but should represent a reason for a multidisciplinary investigation on all the possible causes of hemodynamic imbalance and/or autonomic dysregulation.

Modulation of major voltage- and ligand-gated ion channels in cultured neurons of the rat inferior colliculus by lidocaine.

Acta Pharmacol Sin. 2008 Dec;29(12):1409-1418.

Yu M, Chen L
Auditory Research Laboratory, School of Life Sciences; Hefei National Laboratory for Physical Sciences at Microscale, University of Science and Technology of China, Hefei 230027
China. linchen@ustc.edu.cn.

Aim: The purpose of the present study was to explore how lidocaine as a therapeutic drug for tinnitus targets voltage- and ligand-gated ion channels and changes the excitability of central auditory neurons. Methods: Membrane currents mediated by major voltage- and ligand-gated channels were recorded from primary cultured neurons of the inferior colliculus (IC) in rats with whole-cell patch-clamp techniques in the presence and absence of lidocaine. The effects of lidocaine on the current-evoked firing of action potentials were also examined. Results: Lidocaine at 100 mumol/L significantly suppressed voltage-gated sodium currents, transient outward potassium currents, and the glycine-induced chloride currents to 87.66%+/-2.12%, 96.33%+/-0.35%, and 91.46%+/-2.69% of that of the control level, respectively. At 1 mmol/L, lidocaine further suppressed the 3 currents to 70.26%+/-4.69%, 62.80%+/-2.61%, and 89.11%+/-3.17% of that of the control level, respectively. However, lidocaine at concentrations lower than 1 mmol/L did not significantly affect GABA- or aspartate-induced currents. At a higher concentration (3 mmol/L), lidocaine slightly depressed the GABA-induced current to 87.70%+/-1.87% of that of the control level. Finally, lidocaine at 100 mumol/L was shown to significantly suppress the current-evoked firing of IC neurons to 58.62%+/-11.22% of that of the control level, indicating that lidocaine decreases neuronal excitability. Conclusion: Although the action of lidocaine on the ion channels and receptors is complex and non-specific, it has an overall inhibitory effect on IC neurons at a clinically-relevant concentration, suggesting a central mechanism for lidocaine to suppress tinnitus.

Dorsal cochlear nucleus hyperactivity and tinnitus: Are they related?

Am J Audiol. 2008 Oct 31.

Kaltenbach JA, Godfrey DA
Department of Neurosciences/Otolaryngology-Head and Neck Institute, Cleveland Clinic Foundation, Cleveland, Ohio.

PURPOSE: Eight lines of evidence implicating the DCN as a tinnitus contributing site are reviewed. We now expand the presentation of this model, elaborate on its essential details and provide answers to commonly asked questions regarding its validity. CONCLUSIONS: Over the past decade, numerous studies have converged to support the hypothesis that the dorsal cochlear nucleus (DCN) may be an important brain center in the generation and modulation of tinnitus. Although other auditory centers have been similarly implicated (Melcher et al., 2000; Lockwood et al., 1998; Eggermont and Roberts, 2004; Gerken et al., 1984), the DCN deserves special emphasis because, as a primary acoustic nucleus, it occupies a potentially pivotal position in the hierarchy of functional processes leading to the emergence of tinnitus percepts. Moreover, because a great deal is known about the underlying cellular categories and the details of synaptic circuitry within the DCN, this brain center offers a potentially powerful model for probing mechanisms underlying tinnitus.

Mechanisms of Synaptic Plasticity in the Dorsal Cochlear Nucleus: Plasticity-induced Changes that could Underlie Tinnitus.

Am J Audiol. 2008 Oct 31.

Tzounopoulos T
Chicago Medical School, Rosalind Franklin University, Cell Biology and Anatomy.

PURPOSE: Tinnitus is the persistent perception of a subjective sound. Tinnitus is almost universally experienced in some forms. In most cases recovery may occur in seconds, hours or days. How does tinnitus shift from a transient condition to a life-long disorder? Several lines of evidence, including clinical studies and animal models, indicate that the brain, rather than the inner ear, may in some cases be the site of maintenance of tinnitus. One hypothesis is that normal electrical activity in the auditory system becomes pathologically persistent due to plasticity-like mechanism that can lead to long-term changes in the communication between neurons. A candidate site for the expression of this so-called synaptic plasticity is a region of the brainstem called the Dorsal Cochlear Nucleus (DCN), a site of integration of acoustic and multimodal, sensory inputs. CONCLUSIONS: Here we review recent findings on cellular mechanisms observed in the DCN that can lead to long-term changes on the synaptic strength between different neurons in the DCN. These cellular mechanisms could provide candidate signaling pathways underlying the induction (ignition) and/or the expression (maintenance) of tinnitus.

Stimulation by cochlear implant in unilaterally deaf rats reverses the decrease of inhibitory transmission in the inferior colliculus.

Eur J Neurosci. 2008 Oct;28(8):1589-1602.

Argence M, Vassias I, Kerhuel L, Vidal PP, de Waele C
Laboratoire de Neurobiologie des Réseaux Sensorimoteurs, Université Paris Descartes - CNRS, Centre Universitaire des Saints-Pères, Paris, France.

In the last decade, numerous studies have investigated synaptic transmission changes in various auditory nuclei after unilateral cochlear injury. However, few data are available concerning the potential effect of electrical stimulation of the deafferented auditory nerve on the inhibitory neurotransmission in these nuclei. We report here for the first time the effect of chronic electrical stimulation of the deafferented auditory nerve on alpha1 subunit of the glycinergic receptor (GlyRalpha1) and glutamic acid decarboxylase (GAD)67 expression in the central nucleus of inferior colliculus (CIC). Adult rats were unilaterally cochleectomized by intracochlear neomycin sulphate injection. Fifteen days later, the ipsilateral auditory nerve was chronically stimulated either 4, 8 or 22 h daily, for 5 days using intracochlear bipolar electrodes. GlyRalpha1 and GAD67 mRNA and protein were quantified in the CIC using in situ hybridization and immunohistofluorescence methods. Our data showed that as after

surgical ablation, GlyRalpha1 and GAD67 expression were strongly decreased in the contralateral CIC after unilateral chemical cochleectomy. Most importantly, these postlesional down-modulations were significantly reversed by chronic electrical stimulation of the deafferented auditory nerve. This recovery, however, did not persist for more than 5 days after the cessation of the deafferented auditory nerve electrical stimulation. Thus, downregulations of GlyRalpha1 and GAD67 may be involved both in the increased excitability observed in the CIC after unilateral deafness and consequently in the tinnitus frequently observed in unilateral adult deaf patients. Electrical stimulation of the deafferented auditory nerve in patients may be a potential new approach for treating tinnitus with unilateral hearing loss.

Possible influence on heart rate on tinnitus.

Med Hypotheses. 2009 Jan;72(1):45-46.

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Assuming the possibility of the inner ear damage due to a hemodynamic imbalance essentially due to an abnormal vasomotor regulatory response, the possibility that heart rate (HR) has a correlation with the onset and/or the enhancement of tinnitus is hypothesized. In fact, recent studies have drawn the influence of other factors than blood pressure, in normotensive subjects, in taking part to the regulation of peripheral resistance, outlining the importance of both cardiac output (CO) - which is a function of heart rate (HR) and stroke volume (SV) and SV itself as a dynamic component to baroreflex control of muscle sympathetic nerve activity (MSNA). From this point of view, it could be possible that a condition of bradycardia can enhance tinnitus regardless of its cause, and conversely that a more elevated HR can be related to a relief of this symptom.

The role of sound in adult and developmental auditory cortical plasticity.

Ear Hear. 2008 Dec;29(6):819-829.

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The purpose of the current review is to highlight the role of the acoustic environment in auditory cortical plasticity. In order do this we have reviewed our past studies on auditory cortical plasticity based on long-latency evoked potential recordings in humans following cochlear implantation, and multiple single-unit recordings from cat auditory cortex following noise trauma and exposure to a non-deafening acoustic environment. The results of these studies, and those of other investigators highlighted here, show that the auditory cortex shows plastic changes throughout life. Those that occur during maturation are typically considered the most profound and long lasting. In that case plasticity is beneficial as it allows adaptation to behaviorally important sound and adapts easily to changes induced by deafness and subsequent application of hearing aids or cochlear implants. In children as well as adults, changes in cortical representation of frequency can occur following hearing loss, but may be accompanied by unpleasant side effects such as tinnitus. Long exposure to a spectrally enhanced acoustic environment of moderate sound level that does not cause hearing loss paradoxically also results in pronounced changes in the cortical tonotopic maps. These changes are very similar to those following noise trauma. This review provides evidence that in adults, long-lasting plastic changes in auditory cortex occur even in the absence of behaviorally relevant acoustic stimulation. However, in children, the long lasting absence of auditory stimulation arrests cortical development.

Genetic variants associated with cisplatin-induced ototoxicity.

Pharmacogenomics. 2008 Oct;9(10):1521-1530.

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Cisplatin induces ototoxicity with a huge interindividual variation, which is at least partly based on genetic differences between the affected individuals. Identification of genetic variants that could predict the severity of ototoxicity is an important step towards a more individualized cisplatin treatment. Nevertheless, so far, only a few studies have assessed this issue. This review will address the prevalence of cisplatin-induced ototoxicity, its pathophysiology, quantification and associations with genetic variants. The recent progress in both phenotyping and genotyping is discussed. © 2008 Future Medicine Ltd.

Evaluation of oxidative stress and its effect on acute sensorineural hearing loss.

Practica Oto-Rhino-Laryngologica 101(10) 2008:743-748.

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One hundred thirty-two patients complaining of acute hearing loss or tinnitus were seen at the Department of Otolaryngology in Nippon Koukan Hospital and Koukan Clinic during the one-year period from April 2006 to March 2007. We investigated oxidative stress in 13 of 60 cases of acute sensorineural hearing loss (Group AHL) and 21 of 53 cases of chronic hearing loss, or tinnitus (Group CT). Free Radical Analytical System 4 (diacron-reactive oxygen metabolites) was used to investigate the level of free radical oxidative stress. We compared the d-ROM level between 13 Group AHL patients and 21 Group CT. The d-ROM levels were higher in Group AHL than in Group CT. We compared the d-ROM levels before treatment and after administration of glucocorticoids. After treatment, d-ROM levels decreased in Group AHL and hearing levels also improved. Some patients in Group CT underwent tinnitus retraining therapy (TRT) with a tinnitus control instrument (TCI) and were followed up. We conducted a survey to evaluate patients using the tinnitus handicap inventory (THI) score. Patients who underwent TRT were normal before therapy, but d-ROM levels did not indicate any change between before and after treatment although the THI scores improved significantly. Our findings suggest that acute sensorineural hearing loss is related to oxidative stress at the onset of acute sensorineural hearing loss, such as sudden deafness.

Neural plasticity: For good and bad.

Progress of Theoretical Physics. Supplement 173(2008):48-65.

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The brain's ability to change its organization and function is necessary for normal development of the nervous system and it makes it possible to adapt to changing demands but it can also cause disorders when going awry. This property, known as neural plasticity, is only evident when induced, very much like genes. Plastic changes may be programmed and providing a "midcourse correction" during childhood development. If that is not executed in the normal way severe developmental disorders such as autism may results. Normal development of functions and anatomical organization of the brain and the spinal cord depend on appropriate sensory stimulation and motor activations. So-called enriched sensory environments have been shown to be beneficial for cognitive development and enriched acoustic environment may even slow the progression of age-related hearing loss. It is possible that the beneficial effect of physical exercise is achieved through activation of neural plasticity. The beneficial effect of training after trauma to the brain or spinal cord is mainly achieved through shifting functions from damaged brain area to other parts of the central nervous system and adapting these parts to take

over the functions that are lost. This is accomplished through activation of neural plasticity. Plastic changes can also be harmful and cause symptoms and signs of disorders such as some forms of chronic pain (central neuropathic pain) and severe tinnitus. We will call such disorders “plasticity disorders”.

Noise exposure-induced enhancement of auditory cortex response and changes in gene expression.

Neuroscience Volume 156(2) 2 October 2008:374-380.

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Noise exposure is one of the most common causes of hearing loss. There is growing evidence suggesting that noise-induced peripheral hearing loss can also induce functional changes in the central auditory system. However, the physiological and biological changes in the central auditory system induced by noise exposure are poorly understood. To address these issues, neurophysiological recordings were made from the auditory cortex (AC) of awake rats using chronically implanted electrodes before and after acoustic overstimulation. In addition, focused gene microarrays and quantitative real-time polymerase chain reaction were used to identify changes in gene expression in the AC. Monaural noise exposure (120 dB sound pressure level, 1 h) significantly elevated hearing threshold on the exposed ear and induced a transient enhancement on the AC response amplitude 4 h after the noise exposure recorded from the unexposed ear. This increase of the cortical neural response amplitude was associated with an upregulation of genes encoding heat shock protein (HSP) 27 kDa and 70 kDa after several hours of the noise exposure. These results suggest that noise exposure can induce a fast physiological change in the AC which may be related to the changes of HSP expressions.

III Diagnostics

The effects of acceptance versus thought suppression for dealing with the intrusiveness of tinnitus.

Int J Audiol. 2008 Nov;47 Suppl 2:S112-118.

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The purpose of this study was to examine the effect of acceptance versus suppression of disruptions on a mental imagery task in a sample of tinnitus patients. Previous research has indicated that acceptance can be an effective strategy for dealing with unpleasant experiences such as pain and anxiety. The study used a between-group design, including 47 participants who completed a task involving mental imagery in a sound-proof booth. Participants were randomly assigned to three instruction conditions: acceptance, suppression, or a control condition. The results showed a significant difference between the acceptance group and the control group in that participants in the acceptance group were able to focus on the imagery task for a longer time without being interrupted. The study provides preliminary support for the notion that acceptance can be a helpful strategy for tinnitus patients.

Understanding tinnitus distress: introducing the concepts of moderators and mediators.

Int J Audiol. 2008 Nov;47 Suppl 2:S106-111.

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We focus this theoretical paper on a neglected distinction in tinnitus research between moderators and mediators of tinnitus distress. A moderator variable is one that influences the strength of a relationship between two other variables. In the paper we propose that several variables might act as moderators of tinnitus distress. Degree of hearing loss, arousal, insomnia, characteristics of tinnitus, noise

sensitivity, and a range of psychological factors such as personality and perceived control are discussed as potential moderators. We then move on to mediator variables. A mediator variable is one that explains the relationship between the two other variables, and must by definition be caused by a predictor, and then mediate between the predictor and the dependent variable. We propose that stress levels (caused by tinnitus), classical conditioning, selective attention towards tinnitus, and psychological acceptance of tinnitus (versus experiential avoidance) might be mediators of distress. We encourage more research on moderators and mediators of tinnitus distress, as these will help illuminate treatment protocols and how they might work.

Body image and body concept in patients with chronic tinnitus.

Eur Arch Otorhinolaryngol. 2008 Oct 22.

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The literature leads us to assume that people suffering from tinnitus may also have negative feelings about their body concept and body image. This pilot study aimed to investigate patients with chronic tinnitus for the presence of disturbed body concept and body image, taking into account the subjective degree of distress and any depression. Sixty-five patients with chronic tinnitus (members of a support group) were interviewed concerning the subjective distress caused by their tinnitus, their body image and any depression. Overall, the study collective showed significantly less “vitality and body dynamics,” “attractiveness/self-confidence” and was less pleased with “emphasis on the appearance of one’s own body” than was a predetermined random sample of healthy controls. Comparison of those patients reporting severe tinnitus and those with mild tinnitus showed the former to suffer from significantly greater “uncertainty and concern” with regard to their bodies. In practice, problems involving a person’s body image should be given greater consideration during examination and when planning treatment and, for example, therapy should incorporate body-related exercises.

The additive effect of co-occurring anxiety and depression on health status, quality of life and coping strategies in help-seeking tinnitus sufferers.

Ear Hear. 2008 Dec;29(6):947-956.

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OBJECTIVE: Evaluating the effect of anxiety and depression on clinical measures of general health, tinnitus-specific quality of life, and coping abilities. DESIGN: Two hundred sixty-five chronic, subjective tinnitus sufferers were divided into four psychological symptom groups according to cut-off scores on anxiety and depression subscales of the Hospital Anxiety and Depression Scale: (1) no-symptoms, (2) anxiety-only, (3) depression-only, and (4) anxiety-plus-depression. General health-related quality of life (SF-36), tinnitus-specific quality of life (tinnitus reaction questionnaire and tinnitus handicap inventory), and coping abilities (tinnitus coping style questionnaire) were assessed and analyzed across these four psychological symptom groups, which did not differ on age, gender, marital, and working status. RESULTS: Statistically significant and clinically relevant differences on general health-related and tinnitus-specific quality of life and coping abilities were identified when comparing anxiety-plus-depression subgroup with the subgroups anxiety-only, depression-only, or no-symptoms. Highest associations were seen between the anxiety-plus-depression subgroup and impaired quality of life and maladaptive coping. CONCLUSIONS: Our results demonstrate the additive effect of both anxiety and depression in impairing general health-related and tinnitus-specific quality of life and application of coping strategies, and reiterate the need for investigating both symptoms in the clinical evaluation of tinnitus patients.

Alterations in Event Related Potentials (ERP) associated with tinnitus distress and attention.

Appl Psychophysiol Biofeedback. 2008 Dec;33(4):211-221.

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Tinnitus related distress corresponds to different degrees of attention paid to the tinnitus. Shifting attention to a signal other than the tinnitus is therefore particularly difficult for patients with high tinnitus related distress. As attention effects on Event Related Potentials (ERP) have been shown this should be reflected in ERP measurements (N100, phase locking). In order to prove this hypothesis single sweep ERP recordings were obtained in 41 tinnitus patients as well as 10 control subjects during a period of time when attention was shifted to a tone (attended) and during a second phase (unattended) when they did not focus attention to the tone. Whereas tinnitus patients with low distress showed a significant reduction in both N100 amplitude and phase locking when comparing the attended and unattended measurement condition a group of patients with high tinnitus related distress did not show such ERP alterations. Using single sweep ERP measurements the results of our study show, that attention in high tinnitus related distress patients is captured by their tinnitus significantly more than in low distress patients. Furthermore our results provide the basis for future neurofeedback based tinnitus therapies aiming at maximizing the ability to shift attention away from the tinnitus.

Pulsatile tinnitus associated with internal carotid artery morphologic abnormalities.

Otol Neurotol. 2008 Oct;29(7):1032-1036.

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OBJECTIVES: Internal carotid artery morphologic abnormalities mainly consist of tortuosities and coilings and can present with pulsatile tinnitus (PT). The purpose of this presentation is to report 3 representative cases and propose clinical and radiologic diagnostic criteria. PATIENTS: Three patients presenting with PT. INTERVENTION: Clinical evaluation including auscultation of the ear canal and head and neck. All patients underwent computed tomography angiography of the head and neck. MAIN OUTCOME MEASURES: Clinical evaluation, computed tomography angiography of the head and neck. RESULTS: Head bruit or objective tinnitus were detected in 2 patients. Symptoms of cerebral ischemia were absent. All patients were found to have tortuosities of the internal carotid arteries below the cranium base. One patient, in addition to tortuosity, had coiling as well. CONCLUSION: Morphologic abnormalities of the internal carotid artery may be associated with PT. Proper clinical evaluation coupled with computed tomography angiography of the head and neck can differentiate these abnormalities from other more serious vascular etiologies. Symptoms of cerebral ischemia warrant consultation with a vascular surgeon.

Monaural Tinnitus from a Contralateral Inferior Colliculus Hemorrhage.

Audiol Neurootol. 2008 Sep 4;14(1):35-38.

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A 48-year-old man presented with sudden right ear tinnitus and showed no other otoneurologic signs or symptoms. Auditory brainstem response revealed prolonged III-V interpeak latencies from stimulating either ear. MRI revealed a small, circumscribed lesion of the left inferior colliculus, probably from an acute hemorrhage leading to a small cavernous malformation. Circumscribed lesions of the inferior colliculus are rare with no prior reports of contralateral tinnitus.

[The relationship between tinnitus, personality, and depression]

[Article in German]
Z Psychosom Med Psychother. 2008;54(3):227-240.

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OBJECTIVE: This study examines the relationship between personality characteristics, depression symptoms, demographic profile, and the amount of the tinnitus-related distress experienced. METHOD: 121 patients suffering from tinnitus were examined by unique testing in a tinnitus-practice via three questionnaires over a period of 22 months. RESULTS: A relationship between the severity of tinnitus-related distress and demographic profile as well as a relationship between depression symptoms and the severity of the tinnitus-related distress could be shown. Also, significant results were observed within the personality range in the areas of “impulsiveness,” “aggressiveness,” “demands,” “physical discomfort,” “health worries,” und “emotionality.” Discussion: Patients suffering severely from tinnitus represent a clinically relevant group for psychotherapeutic treatment. Especially persons with comorbid symptoms of depression should be screened regularly and offered additional psychotherapeutic or psychiatric treatment.

Residual inhibition functions overlap tinnitus spectra and the region of auditory threshold shift.

J Assoc Res Otolaryngol. 2008 Dec;9(4):417-435.

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Animals exposed to noise trauma show augmented synchronous neural activity in tonotopically reorganized primary auditory cortex consequent on hearing loss. Diminished intracortical inhibition in the reorganized region appears to enable synchronous network activity that develops when deafferented neurons begin to respond to input via their lateral connections. In humans with tinnitus accompanied by hearing loss, this process may generate a phantom sound that is perceived in accordance with the location of the affected neurons in the cortical place map. The neural synchrony hypothesis predicts that tinnitus spectra, and heretofore unmeasured “residual inhibition functions” that relate residual tinnitus suppression to the center frequency of masking sounds, should cover the region of hearing loss in the audiogram. We confirmed these predictions in two independent cohorts totaling 90 tinnitus subjects, using computer-based tools designed to assess the psychoacoustic properties of tinnitus. Tinnitus spectra and residual inhibition functions for depth and duration increased with the amount of threshold shift over the region of hearing impairment. Residual inhibition depth was shallower when the masking sounds that were used to induce residual inhibition showed decreased correspondence with the frequency spectrum and bandwidth of the tinnitus. These findings suggest that tinnitus and its suppression in residual inhibition depend on processes that span the region of hearing impairment and not on mechanisms that enhance cortical representations for sound frequencies at the audiometric edge. Hearing thresholds measured in age-matched control subjects without tinnitus implicated hearing loss as a factor in tinnitus, although elevated thresholds alone were not sufficient to cause tinnitus.

Vascular loops at the cerebellopontine angle: is there a correlation with tinnitus?

AJNR Am J Neuroradiol. 2008 Oct;29(9):1746-1749.

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BACKGROUND AND PURPOSE: Tinnitus is a common disorder, and the etiology remains mostly unclear. The purpose of this study was to investigate the causative effect of the vascular loop and compression of the vestibulocochlear nerve at the cerebellopontine angle in patients with unexplained tinnitus. MATERIALS AND METHODS: This study was approved by our institutional review board.

Written informed consent was obtained from all participants. Fifty-eight patients with unexplained tinnitus and 44 age- and sex-matched asymptomatic controls were examined with temporal MR imaging. Besides the tinnitus and control groups, a third group was formed by asymptomatic sides of patients with unilateral tinnitus. A 3D fast imaging employing steady-state acquisition (3D-FIESTA) sequence was performed in addition to the regular pre- and postcontrast axial and coronal sequences. The anatomic type of vascular loop, the vascular contact, and the angulation of the vestibulocochlear nerve at the cerebellopontine angle (CPA) were evaluated by 2 experienced neuroradiologists. The chi(2) test was used for statistical analysis. RESULTS: No statistically significant differences were found between the patient and control groups for the anatomic type of vascular loop, the vascular contact, and the angulation of the vestibulocochlear nerve at the CPA (P > .05). CONCLUSION: Although 3D-FIESTA MR imaging correctly shows the anatomic relationships of the vestibulocochlear nerve, its vascular compression cannot be attributed as an etiological factor for tinnitus.

Personality and perception of tinnitus.

Ear Hear. 2008 Oct;29(5):684-692.

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OBJECTIVES: Tinnitus has high prevalence and a wide range of etiologies and of impacts on sufferers. Our objective was to develop understanding of the role of personality in the perception of tinnitus in the general population. As a theoretical basis for this, we combined elements of a general model of signal detection with the ideas of ignition (development) and promotion (neural transmission) of tinnitus, and considered plausible roles for personality factors within this conceptual framework. DESIGN: We interviewed a birth cohort of 970 people aged 32 yr sampled from the general population. On the basis of questioning, we divided them into three groups, those without tinnitus, those with occasional tinnitus (including those with transient tinnitus of very brief duration), and those who experienced tinnitus most of the time. We also established how annoying or distressing the tinnitus was, and assessed personality using the Multidimensional Personality Questionnaire. RESULTS: Tinnitus was experienced rarely by 38.2% and half the time or more by 6.8% of those studied. Men and women did not differ in the amount of tinnitus reported, but women were more likely to find it annoying. People from lower socioeconomic backgrounds were more likely to report tinnitus. People with tinnitus were more socially withdrawn, reactive to stress, alienated, and less Self-Controlled. People who were more annoyed by tinnitus were more socially withdrawn, and men were more stress reactive and alienated. CONCLUSIONS: Our interpretation of the findings is that personality influences the persistence of tinnitus by influencing the tendency to be aware of it. Consideration of personality factors may improve the ability to tailor tinnitus therapies, and the concept of awareness may benefit treatment outcomes by showing tinnitus sufferers a means of internalizing the locus of control over their symptoms.

Imaging in pulsatile tinnitus

Clinical Radiology (in press)

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Tinnitus may be continuous or pulsatile. Vascular lesions are the most frequent radiologically demonstrable cause of pulsatile tinnitus. These include congenital vascular anomalies (which may be arterial or venous), vascular tumours, and a variety of acquired vasculopathies. The choice of imaging depends on the clinical findings. If a mass is present at otoscopy, thin-section computed tomography (CT) is indicated. In the otoscopically normal patient, there is a range of possible imaging approaches. However, combined CT angiography and venography is particularly useful. © 2008 The Royal College of Radiologists.

Diagnostic yield of MRI for audiovestibular dysfunction using contemporary referral criteria: correlation with presenting symptoms and impact on clinical management.
Clinical Radiology (in press).

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Aim: To investigate the diagnostic yield of T2-weighted magnetic resonance imaging (MRI) screening for vestibular schwannoma and other relevant conditions in the setting of audiovestibular symptoms, given the more liberal contemporary referral criteria. To determine whether presenting clinical symptoms correlate with imaging outcome in order to guide future protocols for MRI referral. Materials and methods: Eight hundred and eighty-one consecutive MRI examinations performed in patients with audiovestibular dysfunction were reviewed. Clinical indications and findings were recorded. Case notes were reviewed in patients with positive imaging findings. Two-way, cross-tabulation, Chi-square analysis was performed to assess the relationship between presenting symptoms and imaging outcome. Results: Twelve of the 881 (1.4%) were positive for vestibular schwannoma. A further four of 881 (0.4%) revealed other relevant conditions. Incidental conditions, felt to be irrelevant to the presenting symptoms, were noted in 12 of the 881 (1.4%). In all 12 cases that were positive for vestibular schwannoma, either tinnitus or hearing loss was present. Conclusion: The yield for T2-weighted MRI to diagnose vestibular schwannoma and other relevant retrocochlear conditions was lower than for previous studies, which is likely to reflect trends in referral criteria. No single audiovestibular symptom or combination of symptoms is a statistically significant predictor of imaging outcome. © 2008 The Royal College of Radiologists.

IV Imaging

Metabolic imaging of rat brain during pharmacologically-induced tinnitus.

Neuroimage. 2009 Jan 15;44(2):312-318.

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Although much is known about the perceptual characteristics of tinnitus, its neural origins remain poorly understood. We investigated the pattern of neural activation in central auditory structures using positron emission tomography (PET) imaging in a rat model of salicylate-induced tinnitus. Awake rats were injected with the metabolic tracer, fluorine-18 fluorodeoxyglucose (FDG), once in a quiet state (baseline) and once during salicylate-induced tinnitus. Tinnitus was verified using a behavioral technique. Brain imaging was performed using a high-resolution microPET scanner. Rats underwent magnetic resonance imaging (MRI) and reconstructed MRI and microPET images were fused to identify brain structures. FDG activity in brain regions of interest were quantified and compared. MicroPET imaging showed that FDG activity in the frontal pole was stable between baseline and tinnitus conditions, suggesting it was metabolically inert during tinnitus. Inferior colliculi (p=0.03) and temporal cortices (p=0.003) showed significantly increased FDG activity during tinnitus relative to baseline; activity in the colliculi and temporal cortices increased by 17%+/-21% and 29%+/-20%, respectively. FDG activity in the thalami also increased during tinnitus, but the increase did not reach statistical significance (p=0.07). Our results show increased metabolic activity consistent with neuronal activation in inferior colliculi and auditory cortices of rats during salicylate-induced tinnitus. These results are the first to show that microPET imaging can be used to identify central auditory structures involved in tinnitus and suggest that microPET imaging might be used to evaluate the therapeutic potential of drugs to treat tinnitus.

V Pharmacotherapy

Modulation of major voltage- and ligand-gated ion channels in cultured neurons of the rat inferior colliculus by lidocaine.

Acta Pharmacol Sin. 2008 Dec;29(12):1409-1418.

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Aim: The purpose of the present study was to explore how lidocaine as a therapeutic drug for tinnitus targets voltage- and ligand-gated ion channels and changes the excitability of central auditory neurons. Methods: Membrane currents mediated by major voltage- and ligand-gated channels were recorded from primary cultured neurons of the inferior colliculus (IC) in rats with whole-cell patch-clamp techniques in the presence and absence of lidocaine. The effects of lidocaine on the current-evoked firing of action potentials were also examined. Results: Lidocaine at 100 mumol/L significantly suppressed voltage-gated sodium currents, transient outward potassium currents, and the glycine-induced chloride currents to 87.66%+/-2.12%, 96.33%+/-0.35%, and 91.46%+/-2.69% of that of the control level, respectively. At 1 mmol/L, lidocaine further suppressed the 3 currents to 70.26%+/-4.69%, 62.80%+/-2.61%, and 89.11%+/-3.17% of that of the control level, respectively. However, lidocaine at concentrations lower than 1 mmol/L did not significantly affect GABA- or aspartate-induced currents. At a higher concentration (3 mmol/L), lidocaine slightly depressed the GABA-induced current to 87.70%+/-1.87% of that of the control level. Finally, lidocaine at 100 mumol/L was shown to significantly suppress the current-evoked firing of IC neurons to 58.62%+/-11.22% of that of the control level, indicating that lidocaine decreases neuronal excitability. Conclusion: Although the action of lidocaine on the ion channels and receptors is complex and non-specific, it has an overall inhibitory effect on IC neurons at a clinically-relevant concentration, suggesting a central mechanism for lidocaine to suppress tinnitus.

Gap Detection Methods for Assessing Salicylate-Induced Tinnitus and Hyperacusis in Rats.

Am J Audiol. 2008 Oct 31.

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PURPOSE: A variety of options for behavioral assessment of tinnitus in laboratory animals are available to researchers today. These options are briefly reviewed, followed by data suggesting that gap detection procedures might be used to efficiently measure acute, salicylate-induced tinnitus and possibly hyperacusis in rats. METHOD: Fischer Brown Norway rats (n = 10) were given i.p. injections of 350 mg/kg sodium salicylate on two consecutive days and the effects on gap detection were observed across nine different frequency bands. Pretest, posttest and washout data were collected. An additional four rats were each given four different doses of sodium salicylate (0, 150, 250 and 300 mg/kg) and gap detection and prepulse inhibition were measured. RESULTS: Significant gap detection deficits were observed from pre-to-post test that were consistent with tinnitus. Consistent gap detection deficits were found using broadband noise (BBN) backgrounds, while significant improvements in responding to frequency-specific test bands were found. Similar effects were repeated in the dose-response portion of the study. CONCLUSIONS: Gap detection procedures efficiently measured salicylate-induced changes in behavior that were consistent with the presence of tinnitus. In addition, the reliable, stronger responses at many frequencies after salicylate injections suggest the possibility of measuring a hyperacusis-like phenomenon using these methods.

Rheopheresis for idiopathic sudden hearing loss: results from a large prospective, multicenter, randomized, controlled clinical trial.

Eur Arch Otorhinolaryngol. 2008 Oct 16.

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Idiopathic sudden hearing loss (ISHL) has been suggested to precipitate as final common pathway of microcirculatory impairment of the inner ear associated with a variety of etiologies and characterized by a local hyperviscosity syndrome in cochlear vessels. Therefore, we investigated the effect of Rheopheresis, a method of therapeutic apheresis reducing plasma viscosity and improving microcirculation on hearing recovery. Patients were randomly assigned to receive two Rheopheresis treatments, or treatment according to current German guidelines consisting either of i.v. corticosteroids (methylprednisolon 250 mg for 3 days and subsequent oral dosing with tapering to zero) or i.v. hemodilution (500 mL 6% hydroxyethyl starch plus 600 mg pentoxifylline per day), each applied for 10 days. The primary outcome parameter was absolute recovery of hearing as measured by pure tone audiometry 10 days after the start of treatment. Secondary outcomes were recovery of hearing at day 42, the improvement of speech audiometry, tinnitus and feeling of pressure and the frequency of adverse events. In total, 240 patients with sudden hearing loss were enrolled from otorhinolaryngological departments at hospitals as well as out-patient clinics in Germany. Analysis was performed for the intention-to-treat as well as per protocol population. Mean absolute recovery of hearing on day 10 within the intention-to-treat population (ITT, n = 193) was 23.95 dB (SD 15.05) in the Rheopheresis group and 24.29 dB (SD 15.48) in the control group. Equal efficacy of Rheopheresis and tested standard treatments was demonstrated (P = 0.00056). Single Rheopheresis led to a higher recovery of hearing after 48 h in patients with high plasma viscosity (>1.8 mPas s; P = 0.029) or high total protein (>74 g/dL; P = 0.02). However, an overall good recovery of ISHL was observed with none of the tested therapies being superior regarding the primary outcome parameter. Improvement of health-related quality of life as documented by the SF36 was higher in the Rheopheresis group, exhibiting a significant difference for the physical summary scale at the final follow-up at day 42 (P = 0.006). In conclusion, Rheopheresis proved to be an effective treatment option within the ENT armamentarium for ISHL. Two Rheopheresis treatments within 3 days lasting for about 2 h each could be used to replace a 10-day infusion regimen, especially in patients who desire fast recovery from acute hearing loss. Also, this may be a second line treatment option for patients refractory to i.v. corticosteroids or hemodilution.

Drug-related nephrotoxic and ototoxic reactions : a link through a predictive mechanistic commonality.

Drug Saf. 2008;31(10):877-884.

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BACKGROUND: Drug-induced ototoxicity is a subject of interest because many diseases are treated with drugs that have potential toxic effects on the ear. There is evidence that both inner ear and kidney tissue are immunologically, biochemically and functionally related. It has been suggested that drugs that influence the transport of sodium and/or potassium change ionic homeostasis in the inner ear and, hence, induce functional disturbances such as hearing loss, tinnitus and vertigo. OBJECTIVES: To assess whether renal suspected adverse drug reactions (sADRs) have predictive value for ear and labyrinth adverse drug reactions (ADRs) and whether drug classes involved have influence ion transport systems. STUDY DESIGN: Data were obtained from the Netherlands Pharmacovigilance Centre Lareb. The study base comprised all reports of sADRs up until 1 January 2007. Cases were all sADRs for relevant renal disorders and all sADRs for relevant ear disorders. All other reported sADRs were selected as ‘non-cases’. The relationship between drug classes and renal, ear and labyrinth sADRs was evaluated by calculating reporting odds ratios (RORs). An ROR > or = 1.50 was regarded as a cut-

off value for an association. Drug classes were classified into four groups: (A) ROR kidney <1.50 and ROR ear <1.50 or no reports on ear sADRs (reference group); (B) ROR kidney <1.50 and ROR ear > or = 1.50; (C) ROR kidney > or = 1.50 and ROR ear <1.50 or no reports on ear sADRs; and (D) ROR kidney > or = 1.50 and ROR ear > or = 1.50. For each group, we calculated odds ratios (ORs) for the association between the group classification and the effect on ion channels/ion transport systems in kidney and ear tissues. RESULTS: Of 193 drug classes with relevant ADRs for renal disorders, 120 drug classes also had reports on ototoxic reactions. Fourteen out of 120 drug classes had an ROR > or = 1.50 for the association between the drug class and both renal and ear sADRs. Among these drug classes were several with a well known ability to induce renal (adverse) effects and ear and labyrinth disorders, such as loop diuretics, aminoglycosides and quinine. We found that one mechanistic commonality of the drug classes mentioned in the reports was the ability to affect ion transport systems. The percentage of drugs having this property differed between the four groups. The ORs for groups D and B were significantly higher compared with the reference group (OR 12.2, 95% CI 3.0, 30.5 and OR 8.7, 95% CI 2.4, 18.7, respectively), whereas there was no association for group C. CONCLUSION: Our data suggest that renal sADRs as such are not a marker for drug-induced ear and labyrinth disorders. However, the ability of drugs to act on ion channels or ion transport systems and, therefore, have an influence on ionic homeostasis in the kidney and ear might be a predictor for the possible occurrence of drug-related ototoxicity.

VI Auditive Stimulation

Binaural Hearing after Cochlear Implantation in Subjects with Unilateral Sensorineural Deafness and Tinnitus.

Audiol Neurootol. 2008 Nov 13;14(3):163-171.

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The aim of this clinical study was to assess speech recognition in noise after cochlear implantation in subjects with single-sided deafness and incapacitating tinnitus. 20 subjects complaining of severe intractable tinnitus unresponsive to treatment received a MED-EL cochlear implant (CI). 11 subjects had normal hearing (NH group) on the contralateral side, while 9 used a hearing aid (HA group). The subjects were tested in noise in two listening conditions, i.e. with their acoustic hearing only and with adding the CI to the acoustic hearing (binaural). Subjective improvement in daily life was evaluated using the Speech Spatial and Qualities Hearing Scale (SSQ). The summation effect (3.3 dB for the HA group and 0.6 dB for the NH group) is not significant in both groups. A significant squelch effect of adding the CI was seen for the HA users (3.8 dB), but not for the NH group (1.2 dB). Additionally, a significant effect of adding the CI was found for the spatial configuration where noise is presented in front and speech on the CI side for both the HA group (6.5 dB) and the NH group (1.7 dB). Results of the SSQ show a significant overall benefit of wearing the CI for both groups. The preliminary results of these 20 subjects suggest that cochlear implantation can improve hearing in people suffering from single-sided deafness combined with tinnitus.

Stimulation by cochlear implant in unilaterally deaf rats reverses the decrease of inhibitory transmission in the inferior colliculus.

Eur J Neurosci. 2008 Oct;28(8):1589-1602.

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In the last decade, numerous studies have investigated synaptic transmission changes in various auditory nuclei after unilateral cochlear injury. However, few data are available concerning the potential effect of electrical stimulation of the deafferented auditory nerve on the inhibitory neurotransmission in these nuclei. We report here for the first time the effect of chronic electrical stimulation of the

deafferented auditory nerve on alpha1 subunit of the glycinergic receptor (GlyRalpha1) and glutamic acid decarboxylase (GAD)67 expression in the central nucleus of inferior colliculus (CIC). Adult rats were unilaterally cochleectomized by intracochlear neomycin sulphate injection. Fifteen days later, the ipsilateral auditory nerve was chronically stimulated either 4, 8 or 22 h daily, for 5 days using intracochlear bipolar electrodes. GlyRalpha1 and GAD67 mRNA and protein were quantified in the CIC using in situ hybridization and immunohistofluorescence methods. Our data showed that as after surgical ablation, GlyRalpha1 and GAD67 expression were strongly decreased in the contralateral CIC after unilateral chemical cochleectomy. Most importantly, these postlesional down-modulations were significantly reversed by chronic electrical stimulation of the deafferented auditory nerve. This recovery, however, did not persist for more than 5 days after the cessation of the deafferented auditory nerve electrical stimulation. Thus, downregulations of GlyRalpha1 and GAD67 may be involved both in the increased excitability observed in the CIC after unilateral deafness and consequently in the tinnitus frequently observed in unilateral adult deaf patients. Electrical stimulation of the deafferented auditory nerve in patients may be a potential new approach for treating tinnitus with unilateral hearing loss.

The role of sound in adult and developmental auditory cortical plasticity.

Ear Hear. 2008 Dec;29(6):819-829.

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The purpose of the current review is to highlight the role of the acoustic environment in auditory cortical plasticity. In order do this we have reviewed our past studies on auditory cortical plasticity based on long-latency evoked potential recordings in humans following cochlear implantation, and multiple single-unit recordings from cat auditory cortex following noise trauma and exposure to a non-deafening acoustic environment. The results of these studies, and those of other investigators highlighted here, show that the auditory cortex shows plastic changes throughout life. Those that occur during maturation are typically considered the most profound and long lasting. In that case plasticity is beneficial as it allows adaptation to behaviorally important sound and adapts easily to changes induced by deafness and subsequent application of hearing aids or cochlear implants. In children as well as adults, changes in cortical representation of frequency can occur following hearing loss, but may be accompanied by unpleasant side effects such as tinnitus. Long exposure to a spectrally enhanced acoustic environment of moderate sound level that does not cause hearing loss paradoxically also results in pronounced changes in the cortical tonotopic maps. These changes are very similar to those following noise trauma. This review provides evidence that in adults, long-lasting plastic changes in auditory cortex occur even in the absence of behaviorally relevant acoustic stimulation. However, in children, the long lasting absence of auditory stimulation arrests cortical development.

Incapacitating unilateral tinnitus in single-sided deafness treated by cochlear implantation.

Ann Otol Rhinol Laryngol. 2008 Sep;117(9):645-652.

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OBJECTIVES: Tinnitus is a well-known, difficult-to-treat symptom of hearing loss. Users of cochlear implants (CIs) have reported a reduction in tinnitus following implantation for bilateral severe-to-profound deafness. This study assessed the effect of electrical stimulation via a CI on tinnitus in subjects with unilateral deafness and ipsilateral tinnitus who underwent implantation in an attempt to treat tinnitus with the CI. METHODS: Twenty-one subjects who complained of severe intractable tinnitus that was unresponsive to treatment received a CI. Tinnitus loudness was measured with a Visual Analog Scale; loudness percepts were recorded with the device activated and deactivated. Tinnitus distress was measured with the Tinnitus Questionnaire before and after implantation. RESULTS: Electrical stimulation via a CI resulted in a significant reduction in tinnitus loudness (mean +/- SD; 1 year after implantation, 2.4 +/- 1.8; 2 years after implantation, 2.5 +/- 1.9; before implantation, 8.5 +/- 1.3).

With the device deactivated, tinnitus loudness was still reduced to between 6.1 and 7.0 over 24 months. The Tinnitus Questionnaire revealed a significant positive effect of CI stimulation. CONCLUSIONS: Unilateral tinnitus resulting from single-sided deafness can be treated with electrical stimulation via a CI. The outcomes of this pilot study demonstrate a new method for treatment of tinnitus in select subjects, perhaps an important new indication for cochlear implantation.

Neural tonotopy in cochlear implants: An evaluation in unilateral cochlear implant patients with unilateral deafness and tinnitus.

Hear Res. 2008 Nov;245(1-2):98-106.

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In cochlear implants, the signal is filtered into different frequency bands and transmitted to electrodes along the cochlea. In this study the frequency-place function for electric hearing was investigated as a means to possibly improve speech coding by delivering information to the appropriate cochlear place. Fourteen subjects with functional hearing in the contralateral ear have been provided with a MED-EL cochlear implant in the deaf ear in order to reduce intractable tinnitus. Pitch scaling experiments were performed using single-electrode, constant-amplitude, constant-rate stimuli in the implanted ear, and acoustic sinusoids in the contralateral ear. The frequency-place function was calculated using the electrode position in the cochlea as obtained from postoperative skull radiographs. Individual frequency-place functions were compared to Greenwood's function in normal hearing. Electric stimulation elicited a low pitch in the apical region of the cochlea, and shifting the stimulating electrode towards the basal region elicited increasingly higher pitch. The frequency-place function did not show a significant shift relative to Greenwood's function. In cochlear implant patients with functional hearing in the non-implanted ear, electrical stimulation produced a frequency-place function that on average resembles Greenwood's function. These results differ from previously derived data.

Hearing aids and tinnitus therapy: A 25-year experience.

Journal of Laryngology and Otology 122(10) October 2008:1052-1056.

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Objectives: (1) To assess the subjective tinnitus perception of patients with audiologically proven hearing loss presenting to a tinnitus clinic, both before and after hearing aid provision; (2) to investigate subjective tinnitus perception in patients with unilateral and bilateral hearing loss; and (3) to assess the impact on tinnitus perception, if any, of a digital hearing aid programme in patients provided with hearing aids. Design: Prospective data collection for patients attending a tinnitus clinic over a 25-year period (1980-2004). Setting: University teaching hospital otolaryngology department. Participants: A total of 2153 consecutive patients attending a consultant-delivered specialist tinnitus clinic. Main outcomes measures: A visual analogue scale was used to assess the degree of tinnitus perception improvement, if any, comparing before versus after unilateral or bilateral aiding (in those with audiometrically proven hearing loss). A further assessment compared the effect of digital hearing aid programme introduction on symptomatic tinnitus perception in patients provided with unilateral or bilateral aids. Results: A total of 1440 patients were given hearing aids (826 unilateral and 614 bilateral). There was little difference in tinnitus perception, comparing overall aiding results in unilaterally or bilaterally aided patients. Overall, 554 (67 per cent) of unilaterally aided patients and 424 (69 per cent) of bilaterally aided patients reported some improvement in their tinnitus perception following aiding. There was a statistically significant improvement in tinnitus perception, comparing analogue aids with digital hearing aids, following introduction of a digital hearing aid programme in 2000, in both unilaterally ($p < 0.001$) and bilaterally ($p < 0.001$) aided patients. Conclusions: Provision of hearing aids in patients with audiometrically

demonstrable hearing loss can play a very important part in tinnitus control. The additional improvement in tinnitus control observed following introduction of programmable digital aids had a summative effect in the management of these patients. © 2008 JLO (1984) Limited.

VII Brain Stimulation

[Electrical stimulation as an alternative method of tinnitus treatment][Article in Polish]

Otolaryngol Pol. 2008;62(5):601-605.

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INTRODUCTION: The aim of the study was to evaluate the influence of the selective electrical stimulation of the hearing organ on tinnitus in people with sensorineural hearing loss. MATERIAL AND METHODS: The study comprised 248 tinnitus patients treated by using electrical stimulation. The material was divided into two groups, regarding the method of stimulation. In group I--168 people, transtympanal electrical stimulation of the promontory was applied, whereas in group II--80 people, hydrotransmissive technique was used. ENT examination, audiological and radiological diagnostics, as well as the evaluation of the audiometric parameters of tinnitus was performed. The patients were asked to fill in the questionnaire concerning tinnitus. In 80 patients hydrotransmissive electrical stimulation was conducted using the own prototype device, in 168 patients--transtympanal stimulation, after local anaesthesia with Xylocain gel. RESULTS: On the whole, in group of 248 patients, subjective improvement (decrease in the severity of tinnitus) was noticed in 130 people (52.4%), comprising 32 cases (13%) of total relief. In 93 patients (37.5%) tinnitus remained unchanged, and in 25 (10.1%) the deterioration was observed. The comparison of the results of two electrical stimulation methods, showed the superiority of hydrotransmissive one (improvement in 58.75% of patients), however, the number of cases of total relief was greater in the case of transtympanal method (15.5%). Considering subjective evaluation, as well as audiometric (the intensity and the frequency parameters, MML) the hydrotransmissive method appeared to be more effective (improvement in 53.75%) comparing to transtympanal stimulation (improvement in 44.6%). CONCLUSIONS: On the basis of studies conducted in the Clinic and the long history of the electrical stimulation administration in tinnitus treatment, it can be stated that this method may by applied in cases, in which other therapeutical methods failed.

Dynamic probabilistic atlas of functional brain regions for transcranial magnetic stimulation.

Med Image Comput Comput Assist Interv Int Conf Med Image Comput Comput Assist Interv. 2008;11(Pt 1):543-550.

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Transcranial Magnetic Stimulation (TMS) is a technique to stimulate the brain non-invasively. The applications range from accurate localization of the primary motor areas to potential treatment of disorders such as tinnitus, severe depression, and pain. Stereotactic guidance requires individual MR images of the subject's head, which is in some applications typically omitted due to financial motivations. In this paper, we introduce a method that offers improved TMS pulse targeting also to those subjects who do not have MR examinations. A probabilistic brain model was constructed by spatially normalizing the locations of the functional brain areas in a study population, and modeling the distributions and estimates of the locations of the functional brain regions using probabilistic methods. The application of the probabilistic brain model to the target subject was based on a point set determined from the scalp and facial skin of the target subject. The methods were evaluated using data from four functional brain areas from 56 healthy subjects. The accuracy of the estimates of the locations of the functional brain regions was about nine millimeters.

Transcranial magnetic stimulation.
Curr Opin Psychiatry. 2008 Nov;21(6):640-644.

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PURPOSE OF REVIEW: To present state-of-the-art transcranial magnetic stimulation (TMS) therapy, especially when it is used in psychiatric disorders, on the basis of an exhaustive literature search from 2006 to date (June 2008) on TMS papers published in Medline and Embase. Other references and comments from our own experience started 8 years ago have also been taken into account. RECENT FINDINGS: The mechanism of action of TMS is now better understood. There is strong evidence of the safety and tolerability of TMS when standard protocols are used. The efficacy of the stimulation of the dorsolateral prefrontal cortex in depression is well documented, and there is evidence of the utility of TMS in posttraumatic stress disorder, in persistent auditory hallucinations in schizophrenia and in attention-deficit disorder with hyperactivity. SUMMARY: There is enough evidence of the efficacy and safety of TMS in depression to include this technique in the therapeutic protocols of major depression. However, more research is needed on the use of this technique in other psychiatric and nonpsychiatric disorders such as posttraumatic stress disorder, persistent auditory hallucinations, attention-deficit disorder with hyperactivity and tinnitus.

VIII Behavioral Therapy

Simplified form of tinnitus retraining therapy in adults: a retrospective study.
BMC Ear Nose Throat Disord. 2008 Nov 3;8(1):7.

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BACKGROUND: Since the first description of tinnitus retraining therapy (TRT), clinicians have modified and customised the method of TRT in order to suit their practice and their patients. A simplified form of TRT is used at Ealing Primary Care Trust Audiology Department. Simplified TRT is different from TRT in the type and (shorter) duration of the counseling but is similar to TRT in the application of sound therapy except for patients exhibiting tinnitus with no hearing loss and no decreased sound tolerance (wearable sound generators were not mandatory or recommended here, whereas they are for TRT). The main goal of this retrospective study was to assess the efficacy of simplified TRT. METHODS: Data were collected from a series of 42 consecutive patients who underwent simplified TRT for a period of 3 to 23 months. Perceived tinnitus handicap was measured by the Tinnitus Handicap Inventory (THI) and perceived tinnitus loudness, annoyance and the effect of tinnitus on life were assessed through the Visual Analog Scale (VAS). RESULTS: The mean THI and VAS scores were significantly decreased after 3 to 23 months of treatment. The mean decline of the THI score was 45 (SD = 22) and the difference between pre- and post-treatment scores was statistically significant. The mean decline of the VAS scores was 1.6 (SD = 2.1) for tinnitus loudness, 3.6 (SD = 2.6) for annoyance, and 3.9 (SD = 2.3) for effect on life. The differences between pre- and post-treatment VAS scores were statistically significant for tinnitus loudness, annoyance, and effect on life. The decline of THI scores was not significantly correlated with age and duration of tinnitus. CONCLUSIONS: The results suggest that benefit may be obtained from a substantially simplified form of TRT.

Internet versus group cognitive-behavioral treatment of distress associated with tinnitus: a randomized controlled trial.
Behav Ther. 2008 Dec;39(4):348-359.

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Tinnitus distress can be reduced by means of cognitive-behavior therapy (CBT), and the treatment can be delivered in different ways. The most recent format is Internet-based self-help. The aim of this study was to compare this treatment (n= 26) with standard group-based CBT (n=25) in a randomized controlled trial. Outcomes on self-report inventories measuring tinnitus distress were evaluated

immediately after and 1 year after treatment. Results showed that both groups had improved, and there were few differences between them. The effect size for the Internet treatment was d=0.73 (95% CI=0.16-1.30) and for the group treatment was d=0.64 (95% CI=0.07-1.21). The Internet treatment consumed less therapist time and was 1.7 times as cost-effective as the group treatment. At pretreatment patients rated the Internet treatment as less credible than the group treatment. In conclusion, Internet treatment for tinnitus distress merits further investigation, as the outcomes achieved are promising.

The effects of acceptance versus thought suppression for dealing with the intrusiveness of tinnitus.

Int J Audiol. 2008 Nov;47 Suppl 2:S112-118.

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The purpose of this study was to examine the effect of acceptance versus suppression of disruptions on a mental imagery task in a sample of tinnitus patients. Previous research has indicated that acceptance can be an effective strategy for dealing with unpleasant experiences such as pain and anxiety. The study used a between-group design, including 47 participants who completed a task involving mental imagery in a sound-proof booth. Participants were randomly assigned to three instruction conditions: acceptance, suppression, or a control condition. The results showed a significant difference between the acceptance group and the control group in that participants in the acceptance group were able to focus on the imagery task for a longer time without being interrupted. The study provides preliminary support for the notion that acceptance can be a helpful strategy for tinnitus patients.

Understanding tinnitus distress: introducing the concepts of moderators and mediators.

Int J Audiol. 2008 Nov;47 Suppl 2:S106-111.

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We focus this theoretical paper on a neglected distinction in tinnitus research between moderators and mediators of tinnitus distress. A moderator variable is one that influences the strength of a relationship between two other variables. In the paper we propose that several variables might act as moderators of tinnitus distress. Degree of hearing loss, arousal, insomnia, characteristics of tinnitus, noise sensitivity, and a range of psychological factors such as personality and perceived control are discussed as potential moderators. We then move on to mediator variables. A mediator variable is one that explains the relationship between the two other variables, and must by definition be caused by a predictor, and then mediate between the predictor and the dependent variable. We propose that stress levels (caused by tinnitus), classical conditioning, selective attention towards tinnitus, and psychological acceptance of tinnitus (versus experiential avoidance) might be mediators of distress. We encourage more research on moderators and mediators of tinnitus distress, as these will help illuminate treatment protocols and how they might work.

Body image and body concept in patients with chronic tinnitus.

Eur Arch Otorhinolaryngol. 2008 Oct 22.

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The literature leads us to assume that people suffering from tinnitus may also have negative feelings about their body concept and body image. This pilot study aimed to investigate patients with chronic tinnitus for the presence of disturbed body concept and body image, taking into account the subjective degree of distress and any depression. Sixty-five patients with chronic tinnitus (members of a support group) were interviewed concerning the subjective distress caused by their tinnitus, their body image and any depression. Overall, the study collective showed significantly less “vitality and body dynamics,” “attractiveness/self-confidence” and was less pleased with “emphasis on the appearance of one’s own

body" than was a predetermined random sample of healthy controls. Comparison of those patients reporting severe tinnitus and those with mild tinnitus showed the former to suffer from significantly greater "uncertainty and concern" with regard to their bodies. In practice, problems involving a person's body image should be given greater consideration during examination and when planning treatment and, for example, therapy should incorporate body-related exercises.

The additive effect of co-occurring anxiety and depression on health status, quality of life and coping strategies in help-seeking tinnitus sufferers.

Ear Hear. 2008 Dec;29(6):947-956.

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OBJECTIVE: Evaluating the effect of anxiety and depression on clinical measures of general health, tinnitus-specific quality of life, and coping abilities. DESIGN: Two hundred sixty-five chronic, subjective tinnitus sufferers were divided into four psychological symptom groups according to cut-off scores on anxiety and depression subscales of the Hospital Anxiety and Depression Scale: (1) no-symptoms, (2) anxiety-only, (3) depression-only, and (4) anxiety-plus-depression. General health-related quality of life (SF-36), tinnitus-specific quality of life (tinnitus reaction questionnaire and tinnitus handicap inventory), and coping abilities (tinnitus coping style questionnaire) were assessed and analyzed across these four psychological symptom groups, which did not differ on age, gender, marital, and working status. RESULTS: Statistically significant and clinically relevant differences on general health-related and tinnitus-specific quality of life and coping abilities were identified when comparing anxiety-plus-depression subgroup with the subgroups anxiety-only, depression-only, or no-symptoms. Highest associations were seen between the anxiety-plus-depression subgroup and impaired quality of life and maladaptive coping. CONCLUSIONS: Our results demonstrate the additive effect of both anxiety and depression in impairing general health-related and tinnitus-specific quality of life and application of coping strategies, and reiterate the need for investigating both symptoms in the clinical evaluation of tinnitus patients.

Is it the sound or your relationship to it? The role of acceptance in predicting tinnitus impact.

Behav Res Ther. 2008 Dec;46(12):1259-1265.

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Tinnitus is an experience of sound in the absence of an appropriate external source. A symptom that can accompany most central or peripheral dysfunctions of the auditory system, tinnitus can lead to significant distress, depression, anxiety, and decreases in life quality. This paper investigated the construct of psychological acceptance in a population of tinnitus patients. First, a cross-sectional study (N=77) was conducted in which a tinnitus specific acceptance questionnaire was developed. Results showed that a Tinnitus Acceptance Questionnaire (TAQ) generated good internal consistency. A factor solution was derived with two factors: activity engagement and tinnitus supression. Second, a longitudinal study (N=47) investigated the mediating role of acceptance on the relationship between tinnitus distress at baseline and tinnitus distress, anxiety, life quality, and depression at a 7-month follow-up. The results showed full mediation of activity engagement for depression and life quality at follow-up, partial mediation for tinnitus distress, and no mediation for anxiety. The role of acceptance in the negative impact of tinnitus distress merits further investigation.

Transmeatal Low-Level Laser Therapy for Chronic Tinnitus with Cochlear Dysfunction.

Audiol Neurootol. 2008 Oct 9;14(2):115-120.

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Objectives: To establish the efficacy of low-level laser therapy for tinnitus. Methods: We performed a prospective, randomized double-blind study on 60 outpatients with tinnitus presenting sensorineural hearing loss in the affected ear. They were randomly divided into two groups, the first performing active laser therapy 20 min a day for 3 months with a 650-nm, 5-mW soft laser (group L), the second using a dummy device which duplicated all aspects of active laser therapy except for the activation of the laser beam (group C). One subject in both groups dropped out due to an increase in tinnitus loudness. Two more patients in each group ceased to comply with the protocol due to familiar problems. Results: The Tinnitus Handicap Inventory (THI) was considered the main outcome measure; no statistical difference was detected between the 2 groups in the THI total score (p = 0.97), and its functional (p = 0.89), emotional (p = 0.89) and catastrophic (p = 0.89) subscales. Moreover, a visual analog scale for self-perceived loudness of the tinnitus showed no difference between the groups (p = 0.69). Regarding psychoacoustic parameters, the minimum masking level showed no difference (p = 0.42), while loudness expressed in sensation level exhibited lower values in group L (p = 0.0127). Group L subjects also presented a decreased rate of hyperacusis (p = 0.02). No changes were detected in the audiometric threshold in both groups. Conclusions: Soft laser therapy demonstrated no efficacy as a therapeutic measure for tinnitus. Copyright © 2008 S. Karger AG, Basel.

[The relationship between tinnitus, personality, and depression]

[Article in German]
Z Psychosom Med Psychother. 2008;54(3):227-240.

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OBJECTIVE: This study examines the relationship between personality characteristics, depression symptoms, demographic profile, and the amount of the tinnitus-related distress experienced. METHOD: 121 patients suffering from tinnitus were examined by unique testing in a tinnitus-practice via three questionnaires over a period of 22 months. RESULTS: A relationship between the severity of tinnitus-related distress and demographic profile as well as a relationship between depression symptoms and the severity of the tinnitus-related distress could be shown. Also, significant results were observed within the personality range in the areas of „impulsiveness," „aggressiveness," „demands," „physical discomfort," „health worries," und „emotionality." Discussion: Patients suffering severely from tinnitus represent a clinically relevant group for psychotherapeutic treatment. Especially persons with comorbid symptoms of depression should be screened regularly and offered additional psychotherapeutic or psychiatric treatment.

Personality and perception of tinnitus.

Ear Hear. 2008 Oct;29(5):684-692.

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OBJECTIVES: Tinnitus has high prevalence and a wide range of etiologies and of impacts on sufferers. Our objective was to develop understanding of the role of personality in the perception of tinnitus in the general population. As a theoretical basis for this, we combined elements of a general model of signal detection with the ideas of ignition (development) and promotion (neural transmission) of tinnitus, and considered plausible roles for personality factors within this conceptual framework. DESIGN: We interviewed a birth cohort of 970 people aged 32 yr sampled from the general population. On the basis of questioning, we divided them into three groups, those without tinnitus, those with occasional tinnitus

(including those with transient tinnitus of very brief duration), and those who experienced tinnitus most of the time. We also established how annoying or distressing the tinnitus was, and assessed personality using the Multidimensional Personality Questionnaire. RESULTS: Tinnitus was experienced rarely by 38.2% and half the time or more by 6.8% of those studied. Men and women did not differ in the amount of tinnitus reported, but women were more likely to find it annoying. People from lower socioeconomic backgrounds were more likely to report tinnitus. People with tinnitus were more socially withdrawn, reactive to stress, alienated, and less Self-Controlled. People who were more annoyed by tinnitus were more socially withdrawn, and men were more stress reactive and alienated. CONCLUSIONS: Our interpretation of the findings is that personality influences the persistence of tinnitus by influencing the tendency to be aware of it. Consideration of personality factors may improve the ability to tailor tinnitus therapies, and the concept of awareness may benefit treatment outcomes by showing tinnitus sufferers a means of internalizing the locus of control over their symptoms.

IX Somatic Tinnitus

Triple and Quadruple Spontaneous Cervical Artery Dissection: Presenting Characteristics and Long-Term Outcome.

J Neurol Neurosurg Psychiatry. 2008 Oct 31.

Arnold M, De Marchis GM, Stapf C, Baumgartner RW, Nedeltchev K, Buffon F, Galimanis A, Mattle HP, Bousser MG
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BACKGROUND: Spontaneous cervicocephalic artery dissection (sCAD) of more than two cervical arteries is rare. PATIENTS AND METHODS: We studied vascular and potential sCAD risk factors, triggering events, clinical and neuroimaging findings, and outcome of patients with multiple sCAD. Patients were drawn from prospective hospital-based sCAD registries. RESULTS: Of 740 consecutive patients with sCAD, 11 (1.5%) had 3 and one 4 (0.1%) sCAD. Eight of these 12 patients were women. One patient had additional dissections of the celiac trunk and hepatic artery. Vascular risk factors included hypertension (n=1), hypercholesterolemia (n=6), current smoking (n=5) and migraine (n=6). No patient had a family history of sCAD, fibromuscular dysplasia (FMD) or connective tissue disease. SCAD was preceded by a minor trauma in 5 and infection in 4 patients. Clinical manifestations included ischemic stroke (n=8), transient ischemic attack (n=3), headache (n=9), neck pain (n=4), Horner syndrome (n=5), pulsatile tinnitus (n=2) and dysgeusia (n=1). Brain MRI revealed ischemic infarcts that affected one vessel territory in 7 and two territories in 2 patients. Three-month outcome was favorable (modified Rankin scale score 0-1) in 10 patients (83%). No new recurrent stroke or sCAD occurred during a mean follow-up of 50+-29 months. CONCLUSION: Multiple sCAD occurred preferentially in women and caused clinical symptoms and signs mainly in one vascular territory. In none of the patients FMD or another underlying arteriopathy was apparent. The majority of multiple sCAD was preceded by a minor trauma or infection. Clinical outcome was favorable in most patients and long-term prognosis benign. The data suggest that transient vasculopathy may be a major mechanism for multiple sCAD.

A review of the otological aspects of whiplash injury.

Journal of Forensic and Legal Medicine (in press).

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Approximately 10% of patients who have suffered with whiplash injury will develop otological symptoms such as tinnitus, deafness and vertigo. Some of these are purely subjective symptoms; nevertheless, for the majority there are specific tests that can be undertaken. These tests can quantify the extent and severity of the symptoms as well as provide guidance as to the correct rehabilitation pathway. This article reviews the body of literature relating to the otological aspects of whiplash injury and gives an overview for medical and legal professionals. Crown Copyright © 2008.

X Surgical Treatment

[Management of intracranial arteriovenous malformations]

[Article in Japanese]
Brain Nerve. 2008 Oct;60(10):1103-1113.

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Intracranial arteriovenous malformations (AVMs) are congenital lesions that can cause serious neurological deficits or even death. They can manifest as intracranial hemorrhage, epileptic seizure, or other symptoms such as headache or tinnitus. They are detected by computed tomography or magnetic resonance imaging. Recently there have been significant developments in the management of AVMs. In this paper, the authors represent an overview of the epidemiology of AVMs and the existing treatment strategies. AVMs are ideally excised by standard microsurgical techniques. The grading scale which was proposed by Spetzler and Martin is widely used to estimate the risk of direct surgery. Stereotactic radiosurgery such as that using a gamma knife is very useful for small lesions located in eloquent areas. Technological advances in endovascular surgery have provided new alternatives in the treatment of AVMs. Currently indications for embolization can be divided into (1) presurgical embolization in large AVMs to occlude deep arterial feeding vessels and (2) embolization before stereotactic radiosurgery to reduce the size of the nidus. Palliative embolization can be also applied for patients with large, inoperable AVMs who are suffering from progressive neurological deficits secondary to venous hypertension and/or arterial steal phenomenon.

[Surgical management of jugular foramen tumors]

[Article in Chinese]
Zhonghua Er Bi Yan Hou Tou Jing Wai Ke Za Zhi. 2008 Aug;43(8):570-576.

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OBJECTIVE: To report the clinical manifestations, imaging characteristics, surgical approaches, managements, and outcome of jugular foramen tumors. The detailed clinical information of this extremely rare tumor was presented, with special emphasis on certain key issues, e. g, the preoperative estimation, perioperative management, surgical skill and experience, which exerted an influence on the significance of total tumor resection and preventing complications. METHODS: From 1985 to 2007, 42 patients with jugular foramen tumor (30 cases of jugular paragangliomas and 11 cases of tumor with particular pathological types) were enrolled in this study. Prior to surgical procedures, all patients were subjected to systematic imaging examinations on temporal bone, such as CT, HRCT, CTA, and MRI, and some patients were further examined by angiography or embolization according to the individual situations. The infratemporal type A and combined translabrinthin and/or transchecholea approaches were selected for the treatment of 30 cases of jugular paragangliomas; while, the modalities of infratemporal type A, enlarged mastoidectomy, or mastoid-neck approach were employed for the remaining 11 specific cases. RESULTS: Forty-two patients in this report were categorized into beyond C types based on FISCH classification in which all had invaded to posterior fossa. In the 31 cases, the major initial clinical symptoms were tinnitus, hearing loss, and facial palsy; while, in the 11 specific cases, the main symptoms did not possess any unique trait for the diagnosis and 5 of which were found via CT or MRI examination by chance. Facial nerve management included permanent anterior transposition (19 cases), facial nerve bridge technology (16 cases), interposition graft (4 cases), VII-XI jump graft (2 cases), and VII-XII anastomosis (1 case). CONCLUSIONS: The preoperative estimation of tumor in nature was of great importance in the determination of proper surgical approaches and the infratemporal type A could fully meet the requirement for resection of tumors in jugular foramen. Facial nerve anterior rerouting could provide a clear visual field during the procedure, especially for the lesions in anterior tympanic cavity. In most cases, the facial nerve bridge technology could also fulfill the needs for complete tumor resection as well as the better preservation of facial function.

In case of considering the sacrifice of internal carotid artery, balloon test occlusion was indispensable for preoperative estimation. The CT or MRI characteristics of tumors with particular pathological types were different from those of jugular paragangliomas. The preoperative management, surgical skills, and experience played a pivotal role in complete tumor resection.

Small vestibular schwannomas with no hearing: comparison of functional outcomes in stereotactic radiosurgery and microsurgery.

Laryngoscope. 2008 Nov;118(11):1909-1916.

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OBJECTIVES: To date, numerous studies have compared functional outcomes between stereotactic radiosurgery (SRS) and microsurgery (MS) in the treatment of vestibular schwannomas (VS). However, most of them involve tumors of difference sizes, radiation dosages, and surgical approaches. Few have systematically compared issues of dysequilibrium. By studying only patients with small tumors and no hearing, we sought to minimize confounding variables. STUDY DESIGN: A retrospective chart review and telephone questionnaire. METHODS: From 1998-2006, 31 patients with small (<1.5 cm) VS and nonserviceable hearing (American Academy of Otolaryngology-Head and Neck Surgery [AAO-HNS] Class C or D) were treated at our institution. Twenty-two were available for follow-up and telephone questionnaire, including the University of California Los Angeles Dizziness Questionnaire (UCLA-DQ). Twelve underwent SRS and 10 underwent MS. All MS patients underwent the translabyrinthine approach to their tumors. Outcomes measurements included tumor control, facial nerve function, tinnitus, trigeminal function, and imbalance. RESULTS: Patients undergoing SRS had comparable rates of tumor control, facial nerve function, tinnitus, and trigeminal function to MS patients. However, SRS did result in statistically significantly worse long-term imbalance when compared with MS patients. Detailed comparisons of the two modalities are made. CONCLUSIONS: In our study population, patients with small tumors and no serviceable hearing, these data suggest that MS results in comparable minimal morbidity with SRS, though posttreatment dysequilibrium is significantly decreased. While the authors recommend translabyrinthine resection of small VS with no hearing in patients able to tolerate surgery, the need for further prospective investigation is clear.

Pulsatile tinnitus associated with internal carotid artery morphologic abnormalities.

Otol Neurotol. 2008 Oct;29(7):1032-1036.

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OBJECTIVES: Internal carotid artery morphologic abnormalities mainly consist of tortuosities and coilings and can present with pulsatile tinnitus (PT). The purpose of this presentation is to report 3 representative cases and propose clinical and radiologic diagnostic criteria. PATIENTS: Three patients presenting with PT. INTERVENTION: Clinical evaluation including auscultation of the ear canal and head and neck. All patients underwent computed tomography angiography of the head and neck. MAIN OUTCOME MEASURES: Clinical evaluation, computed tomography angiography of the head and neck. RESULTS: Head bruit or objective tinnitus were detected in 2 patients. Symptoms of cerebral ischemia were absent. All patients were found to have tortuosities of the internal carotid arteries below the cranium base. One patient, in addition to tortuosity, had coiling as well. CONCLUSION: Morphologic abnormalities of the internal carotid artery may be associated with PT. Proper clinical evaluation coupled with computed tomography angiography of the head and neck can differentiate these abnormalities from other more serious vascular etiologies. Symptoms of cerebral ischemia warrant consultation with a vascular surgeon.

Hearing preservation in patients with unilateral vestibular schwannoma after gamma knife surgery.

Prog Neurol Surg. 2008;21:142-151.

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INTRODUCTION: The majority of patients still lose the functionality of their hearing in spite of the technical advances in microsurgery. Our aim was to evaluate the hearing preservation potential of Gamma Knife Surgery. We have reviewed our experience and the literature in order to evaluate the probability to obtain such functional preservation and the factors influencing it. METHODS: Since July 1992, 2,053 patients have been operated on by Gamma Knife Radiosurgery in Timone University Hospital. This population included 184 unilateral schwannoma patients with functional preoperative hearing (Gardner-Robertson 1 or 2) treated by first intention radiosurgery with a marginal dose lower than 13 Gy. The population included 74 patients with subnormal hearing (class 1). All have been studied with a follow-up longer than 3 years. Univariate and multivariate analyses have been carried out. RESULTS: Numerous parameters greatly influence the probability of functional hearing preservation at 3 years, which is globally 60%. The main preoperative parameters of predictability are limited hearing loss that is Gardner-Robertson stage 1 (vs. 2), presence of tinnitus, young age of the patient and small size of the lesion. The functional hearing preservation at 3 years is 77.8% when the patient is initially in stage 1, 80% in patients with tinnitus as a first symptom and 95% when the patient has both. In these patients, the probability of functional preservation at 5 years is 84%. Comparison of these results with the main series of the literature confirms the reproducibility of our results. Additionally, we have demonstrated a higher chance of hearing preservation when the dose to the cochlea is lower than 4 Gy. CONCLUSION: We report a large population of patients treated by radiosurgery with functional preoperative hearing. These results demonstrate the possibility to preserve functional hearing in a high percentage of selected patients. Radiosurgery offers them a higher chance of functional hearing preservation than microsurgery or simple follow-up.

[Neurovascular compression (conflict)]

[Article in Serbian]
Acta Chir Iugosl. 2008;55(2):161-168.

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Since Dandy first reported vascular compression of the trigeminal nerve, the concept of neurovascular compression syndrome for trigeminal neuralgia and hemifacial spasm (HFS) has been accepted, and neurovascular decompression has been performed for this condition. The further investigations indicated that some other clinical syndromes such as glossopharyngeal neuralgia, disabling positional vertigo, tinnitus, geniculate neuarlgia, spasmodic torticolis, essential hypertension, cyclic oculomotor spasm with paresis and superior oblique myokymia also may be initiated by vascular compression of the glossopharyngeal, cochleovestibular, intermediate, accessory, oculomotor and trochlear nerves or the ventrolateral medulla oblongata. In this study several hypotheses regarding the development of cranial nerves vascular compression syndromes are presented. It is alsoemphasized the value of high-resolution magnetic resonance tomographic angiography for visualization of vascular compression. The most frequent clinical syndromes caused by vascular compressionof the cranial nerves are discussed regarding the pathogenesis, symptomes and therapy. We present our series of 124 patients with preoperative evidently positive finding of vascular compression to the trigeminal nerve (MRI). Microvascular decompression (MVD) was performed in all of them. Initial postoperative result was excellent in 110/124 (89%) patients,while in 11/124 (9%) patients the pain relief was satisfactory. In the remaining three patients MVD failed. Recurrence of pain after two years reached 19%. Complications were related to diplopia associated with transient fourth nerve dysfunction in 5 (4%) patients, facial motor dysfunction in 4 (3%) patients, transient facial hypesthesia in 27 (22%) patients and partially hearing loss in 4 (3%) patients. Cerebellar hemorrhagic infarction occurred in 1 (0.8%) patient and cerebrospinal fluid leaks appeared in two (1.6%) cases. There was no lethal outcome.

Vascular loops at the cerebellopontine angle: is there a correlation with tinnitus?

AJNR Am J Neuroradiol. 2008 Oct;29(9):1746-1749.

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BACKGROUND AND PURPOSE: Tinnitus is a common disorder, and the etiology remains mostly unclear. The purpose of this study was to investigate the causative effect of the vascular loop and compression of the vestibulocochlear nerve at the cerebellopontine angle in patients with unexplained tinnitus. MATERIALS AND METHODS: This study was approved by our institutional review board. Written informed consent was obtained from all participants. Fifty-eight patients with unexplained tinnitus and 44 age- and sex-matched asymptomatic controls were examined with temporal MR imaging. Besides the tinnitus and control groups, a third group was formed by asymptomatic sides of patients with unilateral tinnitus. A 3D fast imaging employing steady-state acquisition (3D-FIESTA) sequence was performed in addition to the regular pre- and postcontrast axial and coronal sequences. The anatomic type of vascular loop, the vascular contact, and the angulation of the vestibulocochlear nerve at the cerebellopontine angle (CPA) were evaluated by 2 experienced neuroradiologists. The chi(2) test was used for statistical analysis. RESULTS: No statistically significant differences were found between the patient and control groups for the anatomic type of vascular loop, the vascular contact, and the angulation of the vestibulocochlear nerve at the CPA ($P > .05$). CONCLUSION: Although 3D-FIESTA MR imaging correctly shows the anatomic relationships of the vestibulocochlear nerve, its vascular compression cannot be attributed as an etiological factor for tinnitus.

Superior canal dehiscence plugging reduces dizziness handicap.

Laryngoscope. 2008 Oct;118(10):1809-1813

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OBJECTIVES/HYPOTHESIS: To compare dizziness handicap inventory (DHI) scores before and after surgery for plugging of superior canal dehiscence (SCD). The size of the dehiscence as measured during surgery, subject age, vestibular-evoked myogenic potentials threshold, and degree of conductive hearing loss (CHL) were also considered. STUDY DESIGN: Retrospective. METHODS: Nineteen adults with SCD who underwent surgery to plug the SCD via middle fossa approach were studied. Pre- and postoperative DHI scores were compared, and correlations between DHI scores and other clinical measures were assessed. RESULTS: Average preoperative DHI score was 44 +/- 24 (mean +/- SD). Postoperative DHI score was significantly lower at 18 +/- 15 ($P < .01$). Only two subjects had a higher DHI score after surgery. Subjects who had a preoperative DHI score below 30 did not have any significant change in their DHI score after surgery, whereas those with a preoperative DHI score >or=30 had an improvement by an average of 39 +/- 16 after surgery. There were no correlations between either preoperative DHI score or the change in DHI score after surgery and HL, age, vestibular-evoked myogenic potentials threshold, or dehiscence size. CONCLUSIONS: DHI scores significantly decreased after SCD plugging. Subjects who had the largest decrease in DHI scores were those with high preoperative DHI scores. Subjects who chose to undergo SCD plugging because of nonvestibular symptoms such as conductive HL, tinnitus, or autophony generally had lower preoperative DHI scores and did not experience large improvements in DHI scores. The SCD plugging procedure offers an improvement in DHI score that is comparable with that of other procedures for peripheral vestibular dysfunction.

Management of intracranial arteriovenous malformations.

Brain and Nerve. October 2008 60(10):1103-1113.

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Intracranial arteriovenous malformations (AVMs) are congenital lesions that can cause serious neurological deficits or even death. They can manifest as intracranial hemorrhage, epileptic seizure, or other symptoms such as headache or tinnitus. They are detected by computed tomography or magnetic resonance imaging. Recently there have been significant developments in the management of AVMs. In this paper, the authors represent an overview of the epidemiology of AVMs and the existing treatment strategies. AVMs are ideally excised by standard microsurgical techniques. The grading scale which was proposed by Spetzler and Martin is widely used to estimate the risk of direct surgery. Stereotactic radiosurgery such as that using a gamma knife is very useful for small lesions located in eloquent areas. Technological advances in endovascular surgery have provided new alternatives in the treatment of AVMs. Currently indications for embolization can be divided into (1) presurgical embolization in large AVMs to occlude deep arterial feeding vessels and (2) embolization before stereotactic radiosurgery to reduce the size of the nidus. Palliative embolization can be also applied for patients with large, inoperable AVMs who are suffering from progressive neurological deficits secondary to venous hypertension and/or arterial steal phenomenon.

XI Holistics

[Discussion on the citation of acu-moxibustion treatment verses in textbook acupuncturology]

[Article in Chinese]
Zhen Ci Yan Jiu. 2008 Aug;33(4):272-276.

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Verses on Acu-moxibustion Treatment have played an important role in the pervasion and spread of indications of acupoints. Abundant verses are widely cited in different versions of the textbook Acupuncturology for university and college students in China. Some contents about clinical indications of acupoints are even listed in partial verses. However, one important issue should be noted that the source of some indications of acupoints summarized in these verses needs being investigated, and the indications of some acupoints have been seldom mentioned in literature. For example, Sizhukong (TE 23) is used to treat toothache, Diwuhui (GB 42) used to treat tinnitus, Shangqiu (SP 5) used to treat jaundice, Chongmen (SP 12) selected to treat metrorrhagia, metrostaxis and abnormal vaginal discharge, Sanjiaoshu (BL 22) chosen to treat dysentery, etc. These descriptions (indications of these acupoints) need being verified in clinical practice, and thus should be used cautiously. Moreover, the verse is a type of barriers of literature in which some errors may occur in the course of spread from generation to generation and are also inherited in verses. For instance, Fubai (GB 10) is employed to treat scrofula, Yanggang (BL 48) employed to treat jaundice, Yishe (BL 49) used to treat vomiting and difficulty in swallowing, Shiguan (KI 18) taken to treat sterility, Yamen (GV 15) taken to treat epilepsy, etc. Therefore, the editors of teaching materials for acu-moxibustion should take a very cautious attitude when using such kinds of contents in verses.

Whiplash injuries and associated disorders: New insights into an old problem.

European Spine Journal 17 SUPPL.3, October 2008:S359-S417.

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The Medical Task Force of the Swedish Society of Medicine and the Whiplash Commission has come to the following main conclusions: The term “whiplash” is so generally accepted that it should continue to be used, but the term “whiplash trauma” should only be used to refer to indirect cervical spine trauma.

By deleting WAD grades 0 and IV from the classification system introduced in 1995 by the Quebec Task Force (QTF), the diagnosis of whiplash injury will be more exact and more realistically defined, which will reduce the risk of misunderstanding. The reported incidence of whiplash injuries in Sweden varies depending on the particular investigation cited, and ranges between 1.0 and 3.2/1000 per year. Whiplash injuries represent approximately 1/3 of all claims submitted after traffic injuries to insurance companies in Sweden, and give rise to a medical disability rate of 10% or more. Various studies of how the possibility of an insurance claim influences the course of a whiplash injury have produced quite different results, but generally there is no evidence of significant differences in outcome between those who have and have not sought claim. Ligament injuries can rarely be demonstrated acutely after whiplash trauma, and radiologically verified instability later in the course of the injury is also rare. Experimental studies have shown that whiplash trauma can lead to loads on discs and facet joints that might result in injury of these structures, but there is no scientific evidence to verify such injuries in patients with whiplash injury. Certain studies indicate that a dysfunction in the nervous system may exist in a small proportion of patients with whiplash injury. A series of physiological changes occurs in both the peripheral and the central nervous systems after whiplash injury, comprising peripheral as well as central sensitisation. There is no scientific evidence that such physiological changes are specific to the pain associated with whiplash injury; similar changes have been shown to occur in association with various other pain conditions, acute as well as long-term. It is likely that any previous mental ill-health and the patient's current mental state are both important for the clinical development and course of whiplash injury. To minimise the risk of long-term problems among people with acute whiplash injury, concurrently occurring acute stress disorder (ASD) and/or post-traumatic stress disorder (PTSD) should be diagnosed and treated. It is also important to diagnose and adequately treat possible sleep disorder, depression, or anxiety among people with whiplash injury. Neck problems in terms of pain and stiffness, either with or without objective clinical findings such as decreased range of motion and tenderness at palpation (WAD grades I and II), are most common. Symptoms usually appear within the first day and up to a few days after whiplash trauma. Headache commonly occurs, along with pain in the shoulders and the thoracic spine. Neurological symptoms are present in approximately 20% of patients, though only 3-4% display objective neurological findings (WAD grade III). Symptoms such as sleep disorder, memory and concentration difficulties, and signs of stress are reported in approximately 25% of cases. The prognosis after whiplash injury is usually favourable, and 90-95% of patients recover completely or experience only minor ongoing problems. Risk factors can often be identified early, high pain intensity and a high grade of WAD being warning signs. Fear or avoidance of motion and other psychiatric reactions should be identified early on. Patients with whiplash injuries comprise a heterogeneous group in terms of severity, clinical problems, and objective findings, so treatment should be individualised. If a patient complains of vertigo that has occurred acutely after whiplash injury, benign positional vertigo should be the primary differential diagnosis and tests for this condition should be performed. Vertigo characterised by instability is not uncommon in association with late whiplash-related problems, but the background to such vertigo is often unclear and diagnostic tests that can relate the vertigo problems to the whiplash trauma are lacking. If considerable hearing impairment or tinnitus occurs during the acute phase after whiplash injury, a hearing examination should be performed. Early management of people with whiplash injury should include documentation of pain intensity and possible neurological symptoms and findings, as well as of possible stress, fear, and anxiety. The grade of WAD should be determined. Appropriate treatment initiatives are dependent on pain intensity and grade of WAD, and should take account of the patient's entire circumstance in cases of delayed recovery. Information and advice should be directed towards a rapid return to normal activity, since most people do recover. Patients' own active, adaptive strategies, such as daily, regular head and shoulder movements to the pain threshold, relaxation exercises, and walks should be encouraged. Use of a cervical collar, however, has no role in treatment. Any pharmacological or other treatment should be regular, temporary, and followed up. In cases of persistent pain after one month and difficulties with work and daily activities, co- ordinated evaluation at a primary care unit, or alternatively at a pain specialist unit, is recommended. In the acute phase there is no need for the x-ray examination of patients under age 65 with WAD grade I complaints, except for those with concurrent skeletal disease, such as Bechterew's disease (ankylosing spondylitis) and rheumatoid arthritis. In cases of WAD grade II, plain x-ray or computerised tomography (CT) is recommended. If there are symptoms indicating spinal nerve root or spinal cord involvement, CT is recommended.

In cases of WAD grade III with objective neurological findings, CT is the primary investigative modality and additional investigation with magnetic resonance imaging (MRI) is often indicated. Neurophysiological examinations such as eye movement tests, neck torsion tests, cervical kinaesthesia/joint position error, and posturography should not be used in routine care, since these investigations are of no documented diagnostic value with regard to whiplash injuries. These tests should be reserved for use in association with clinical research. There is a need for improved knowledge in all the areas covered in this document; ongoing research into, for example, injury causes, pain mechanisms, and the background to functional impairment associated with whiplash injury is therefore crucial. We also need continued research into diagnosis and treatment, as well as medical insurance aspects. Through continued basic and clinical research, a platform can be created for improved diagnostic methods and treatment modalities in association with whiplash injury.

XII Review

XIII Others

Effects of colour exposure on auditory and somatosensory perception--hints for cross-modal plasticity.

Neuro Endocrinol Lett. 2008 Aug;29(4):518-521.

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OBJECTIVES: It is well known that colour exposure can influence emotions, behaviour and perception. To get further insight into these complex synesthetic phenomena, the effect of colour stimulation on auditory and somatosensory perception was systematically investigated. METHODS: 14 healthy male volunteers with normal colour vision rated the loudness of auditory stimuli with a standardized scale during exposure to white, red and green light. Furthermore temperature perception was assessed during exposure of the different colours using a thermal sensory analyser. RESULTS: Colour exposure significantly altered auditory and somatosensory perception. Red light enhanced loudness perception and decreased cold pain thresholds, while green light stimulation reduced loudness perception and increased detection and pain thresholds for warm stimuli. CONCLUSIONS: This data give further evidence for cross-modal plasticity in human perception. Colour stimulation influences auditory and somatosensory perception and may therefore have potential as a new treatment strategy of phantom perceptions such as tinnitus or chronic pain.

Migraine and audiovestibular dysfunction: is there a correlation?

Am J Otolaryngol. 2008 Sep-Oct;29(5):295-299.

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PURPOSE: To study the audiovestibular functions in cases of migraine with or without vertigo. MATERIALS AND METHODS: This was a prospective study involving 50 cases of migraine who were divided into 2 groups: patients with vertigo and those without. All patients underwent a detailed otological and neurootological examination followed by full audiological and vestibular investigation including pure tone audiometry, speech reception threshold, speech discrimination score, tone decay, short increment sensitivity index, auditory brainstem-evoked responses, and electronystagmography (ENG). RESULTS: Thirty-eight (76%) of 50 patients had vertigo on presentation, of which rotatory nonpositional vertigo (22/38) was the most common. Phonophobia was the most common auditory symptom (35/50, 70%) followed by tinnitus (25/50, 50%). Only 17 patients (34%) reported hearing loss, of whom only 7 had documented hearing loss on pure tone audiometry. However, the auditory brainstem-evoked responses of all these patients showed some abnormalities in the form of prolonged absolute latency or prolonged

interwave peak latencies or both. Electronystagmography revealed canal paresis in 13 patients (26%), although there was no statistical difference between patients with or without vertigo on various electronystagmographic parameters. CONCLUSION: Auditory brainstem-evoked response abnormalities may be the earliest indicator of impending auditory involvement in migraine.

Hyperbaric oxygen therapy seems to enhance recovery from acute acoustic trauma.

Acta Otolaryngol. 2008 Oct;128(10):1110-1115.

Ylikoski J, Mrena R, Makitie A, Kuokkanen J, Pirvola U, Savolainen S
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CONCLUSION: The average recovery of hearing and cessation of tinnitus was significantly better after hyperbaric oxygen therapy (HBOT) than after normobaric oxygen therapy (NBOT). HBOT can be valuable adjuvant therapy for patients with acute acoustic trauma (AAT). OBJECTIVES: AAT was one of the early indications for the use of HBOT. The rationale of administering oxygen to patients with AAT is based on experimental studies showing that noise exposure results in cochlear hypoxia, which could be compensated by HBOT. The aim of this study was to investigate the efficacy of HBOT in patients with AAT. PATIENTS AND METHODS: We compared the recovery from hearing impairment and tinnitus in 60 ears treated with HBOT with 60 ears treated with NBOT. The HBOT was given daily for 1-8 days. There were no significant differences in clinical or audiological data between HBOT and NBOT groups. RESULTS: The average recovery of hearing both at high and speech frequencies was significantly better and tinnitus persisted less commonly after the HBOT than after the NBOT. Normal hearing at the end of the follow-up period was regained in 42 ears in the HBOT group and in 24 ears in the NBOT group ($p<0.01$).

Dizziness.

Medicine. Oct 2008 36(10):535-539.

Murdin L, Davies R
National Hospital for Neurology and Neurosurgery, University College London Hospitals NHS Trust, London, United Kingdom, National Hospital for Neurology and Neurosurgery, Institute of Neurology, London, United Kingdom

Dizziness is common, and approximately 1% of the population consult a GP each year for this symptom. Vertigo is more specific, and suggests a vestibular disorder. Visual and proprioceptive inputs are also important in maintaining balance. Features in the history help localize the problem. Physical examination includes assessment of hearing, eye movements, including the Halmagyi test and Hallpike positional testing and postural blood pressure. Investigations, including caloric testing or electronystagmography, may support the diagnosis. Patients benefit from an accurate diagnosis and explanation of their condition. Vestibular sedatives can be used to manage symptoms acutely but prolonged use should be avoided as these drugs delay compensation. Benign paroxysmal positional vertigo (BPPV) can be treated with particle repositioning manoeuvres. Mènière's disease can usually be managed with a low-salt diet and diuretics, while patients with migrainous vertigo can be successfully treated with migraine prophylactic drugs. Many of these disorders remit spontaneously, but in some cases symptoms are progressive. It is appropriate to refer the patient to an audiovestibular physician or other specialist with an interest if the diagnosis is unclear, compensation fails to occur within 3 months following an acute episode, or the dizziness is associated with hearing loss, tinnitus or neurological symptoms. © 2008.

XIV Case Reports

Goya's deafness.

Pract Neurol. 2008 Dec;8(6):370-377.

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Francisco Goya (1746-1828), a major Spanish artist, became profoundly deaf aged 46 years, following an acute illness. Despite this, his success continued and he eventually died aged 82 years. His illness is sketchily documented in letters written during his convalescence, describing headache, deafness, tinnitus, unsteadiness and visual disturbance with recovery (apart from deafness) over three months. There was a milder similar illness two years before, suggesting a relapsing condition. Vogt-Koyanagi-Harada syndrome, although previously accepted as Goya's diagnosis, is not supported by the limited evidence. Susac's syndrome or Cogan's syndrome, although both rare, are more likely explanations.

Hearing improvement after resection of a large jugular foramen schwannoma: case report.

Skull Base. 2008 May;18(3):195-199.

Lekovic GP, Gonzalez LF, Weisskopf P, Smith KA
Division of Neurological Surgery, St. Joseph's Hospital and Medical Center, Phoenix, Arizona.

Although hearing improvement after surgery for small tumors of the cerebellopontine angle has been reported, the mechanism by which surgery leads to the improvement in hearing remains controversial. We report a patient who sought treatment for progressive tinnitus and hearing loss. Magnetic resonance imaging showed a large (5-cm) schwannoma in the cerebellopontine angle. At surgery the lesion was found to originate from rootlets of cranial nerve X at the jugular foramen. The patient underwent gross total resection of the tumor. Immediately after surgery, his hearing improved dramatically. We believe that our patient represents an example of hearing impairment at least in part referable to direct compression of the brainstem. Importantly, the patient's hearing deficit was completely reversible. Some authors claim that surgery to preserve hearing may be contraindicated in patients with speech discrimination scores below 50%. However, when extrinsic brainstem compression may contribute to the cause of such a hearing decrement, postoperative improvement in hearing may be a reasonable expectation.

Course of auditory impairment in Cogan's syndrome.

Am J Otolaryngol. 2009 Jan-Feb;30(1):65-68.

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PURPOSE: Cogan's syndrome (CS), characterized by interstitial keratitis, hearing loss, and vestibular impairment, rarely occurs in children. Hearing loss is commonly bilateral and permanent in 37%-67% of patients. To date, long-term evaluation of hearing impairment in children with CS has been reported in only 3 patients. We describe the 35-month course of hearing impairment in a teenaged boy with Cogan's syndrome. MATERIALS AND METHODS: The medical record of a 15-year-old boy with Cogan's syndrome was reviewed. Data included relevant history and physical examination, diagnostic workup, and management. RESULTS: The patient was diagnosed with bilateral uveitis at age 12 and was placed on oral steroid and methotrexate. He developed sudden sensorineural hearing loss, intermittent tinnitus, and no vestibular dysfunction approximately 9 months after the ophthalmic disease onset. The initial audiogram revealed mild to moderate right-sided high-frequency sensorineural hearing loss and profound left-sided sensorineural hearing loss. Steroid dosage was increased, and the patient exhibited right-side hearing improvement within 2 months. Hearing thresholds reached within normal limits on the right side at 4 months and continued to improve up to 12 months on the left side. CONCLUSIONS: In a teenager with Cogan's syndrome, the severity and course of hearing impairment showed interaural differences. Improvement of hearing thresholds was slower and incomplete on the left ear. Further studies examining the course of cochleovestibular impairment in a larger group of patients with Cogan's syndrome potentially improve management and counseling.

Recurrent audiovestibular disturbance initially mimicking Ménière's disease in a patient with anterior inferior cerebellar infarction.

Neurol Sci. 2008 Oct;29(5):359-362.

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An anterior inferior cerebellar artery (AICA) stroke is characterized by vertigo, tinnitus, and deafness in addition to facial weakness, hemiataxia, and hypalgesia. Sometimes, it can present as sudden deafness with vertigo, without brainstem or cerebellar signs. We report a 55-year-old woman with hypertension and diabetes, showing recurrent audiovestibular disturbance before a typical pattern of AICA infarction, which was initially diagnosed as Ménière's disease. In elderly patients with recurrent hearing loss and vertigo lasting several minutes, lack classic brainstem or cerebellar signs, if they have vascular risk factors, physicians may also consider the potential symptom of AICA infarction.

Spontaneous intracranial hypotension presenting to the ENT surgeon: case report.

J Laryngol Otol. 2008 Oct 17:1-3.

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Objective:To highlight a case of spontaneous intracranial hypotension presenting to the ENT surgeon. Method:We present a case report and a review of the literature concerning spontaneous intracranial hypotension.Results:Spontaneous intracranial hypotension is a rare diagnosis, particularly to the ENT surgeon. We report a patient with tinnitus, hearing loss and headache, symptoms suggestive of an ENT diagnosis such as Ménière's disease or vestibular schwannoma. However, magnetic resonance imaging revealed the characteristic findings of spontaneous intracranial hypotension. The patient's symptoms resolved, except for a mild residual tinnitus, with conservative management alone.Conclusion:This case highlights the importance of considering spontaneous intracranial hypotension as a differential diagnosis of certain ENT symptoms.

Clinicoradiological features of rosette-forming glioneuronal tumor (RGNT) of the fourth ventricle: report of four cases and literature review.

J Neurooncol. 2008 Dec;90(3):301-308.

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Background Rosette-forming glioneuronal tumor (RGNT) of the fourth ventricle is a recently characterized rare tumor entity. Despite benign histological features and a reported favorable postoperative course, there is still limited clinical experience with this tumor. Methods Retrospective analysis of the clinical, radiological, and surgical data in four patients with RGNT was performed. Mean age at diagnosis was 35 years, and the median follow-up was 19 (range 2-30) months. The results were compared with the literature. Results Patient 1 presented on an emergency basis due to intratumoral hemorrhage and tumor enlargement followed by life-threatening obstructive hydrocephalus. Patient 2 suffered from headaches and left-sided hemiparesthesia 6 months prior to surgery. Patient 3 developed headaches with nausea and vomiting, followed by left-sided tinnitus 1 year prior to surgery. In patient 4, RGNT was detected incidentally. No differentiating radiological characteristics were seen except for the presence of minute satellite lesions in two patients. Histopathological findings were distinct and showed their typical biphasic neurocytic and glial architecture. No progression/recurrence was seen in the postoperative course. Conclusions The spectrum of presenting symptoms of RGNT is wide, nonspecific, and typically depends on tumor size and extent. This tumor entity should be considered in the differential diagnosis of posterior fossa masses in order to avoid undue surgical aggressiveness.

Secondary intracranial hypertension with acute intracranial pressure crisis in superficial siderosis.

J Clin Neurosci. 2008 Oct;15(10):1168-1170.

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Superficial siderosis of the central nervous system is a very rare disease related to hemosiderin deposits in the brain, brainstem, cerebellum and spinal cord due to chronic subarachnoid hemorrhage. Chronic increased intracranial pressure develops in about one-third of affected cases. We report a patient with superficial siderosis and sudden intracranial pressure crisis. A 29-year-old man experienced a subacute episode of headache, tinnitus and blurred vision. Magnetic resonance imaging of the brain revealed hemosiderin deposits characteristic of superficial siderosis. Extensive diagnostic work-up excluded causative pathologies of bleeding. Lumbar puncture and continuous intra-ventricular cerebrospinal fluid (CSF) pressure monitoring revealed continuous CSF pressure increase. Implantation of a ventriculo-peritoneal shunt led to complete clinical recovery. Our case emphasizes that patients with superficial siderosis may present with sudden elevation of intracranial pressure due to chronic intracranial hypertension. In this situation permanent CSF drainage provides a useful therapeutic option.

A difficult case: sarcoidosis of the middle ear.

American Journal of Otolaryngology - Head and Neck Medicine and Surgery (in Press).

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Sarcoidosis is a common multisystemic granulomatous disorder affecting several organs and tissues. However, the respiratory tract is the region commonly involved in more than 90% of patients, and the middle ear is a direct extension of it. In spite of this, direct middle ear and/or mastoid involvement of sarcoidosis is more rarely seen. Otological involvement may mimic a number of other diseases of the ear; sarcoidosis will probably not be considered prospectively. In addition, pulmonary symptoms of the patients often go unnoticed for some time. We report a patient presenting with hearing loss and tinnitus as the primary manifestation of sarcoidosis of the ear.

A typical incus necrosis: A case report and literature review.

Journal of Laryngology and Otology. Oct 2008 122(10):1124-1126.

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Objective: We report an atypical case of ossicular necrosis affecting the incus, in the absence of any history of chronic serous otitis media. We also discuss the current theories of incus necrosis. Case report: A male patient presented with a history of right unilateral hearing loss and tinnitus. Audiometry confirmed right conductive deafness; tympanometry was normal bilaterally. He underwent a right exploratory tympanotomy, which revealed atypical erosion of the proximal long process of the incus. Middle-ear examination was otherwise normal, with a mobile stapes footplate. The redundant long process of the incus was excised and a partial ossicular replacement prosthesis was inserted, resulting in improved hearing. Conclusion: Ossicular pathologies most commonly affect the incus. The commonest defect is an absent lenticular and distal long process of the incus, which is most commonly associated with chronic otitis media. This is the first reported case of ossicular necrosis, particularly of the proximal long process of the incus, in the absence of chronic middle-ear pathology.

Clinical Trials

Source: clinicaltrials.gov (5th December 2008)

The Effect of Tinnitus Retraining Therapy on Subjective and Objective Measures of Chronic Tinnitus

Current status	not yet open for participant recruitment
Sponsors and collaborators	Tinnitus Research Consortium
Information provided by	Tinnitus Research Consortium
ClinicalTrials.gov Identifier	NCT00124800
Purpose	The objective of this study is to examine the efficacy of tinnitus retraining therapy (TRT) as a treatment of chronic tinnitus in people with limited hearing loss. The study design is prospective, randomized, double-blind, with repeated measures. The null hypothesis states there will be no difference in subjective measures of tinnitus severity between subjects treated with standard TRT and subjects treated with sham TRT
Condition(s)	Tinnitus
Interventions	Behavioral: Tinnitus retraining therapy Device: Sound therapy
Phase	I
Study type and design	Interventional; Treatment, Randomized, Double-Blind, Placebo Control, Parallel Assignment, Efficacy Study
Official title	The Effect of Tinnitus Retraining Therapy on Subjective and Objective Measures of Chronic Tinnitus
Detailed Description	The specific aims of the study are to: - Evaluate the efficacy of TRT in reducing the objective magnitude of tinnitus. - Evaluate the efficacy of TRT in reducing the subjective awareness and impact of tinnitus. - Determine the therapeutic time course of improvement in tinnitus. - Determine the long-term improvement in tinnitus derived from TRT.
Primary Outcomes	- Change in objective measure of tinnitus loudness using psychoacoustic matching task - Change in subjective handicap rating of tinnitus using a standardized questionnaire
Secondary Outcomes	Change in subjective ratings of tinnitus loudness, annoyance and awareness
Expected total Enrollment	40
Study start	September 2005

Expected study completion date	June 2008
Participants (age)	18 Years to 75 Years
Gender	both
Accepts health volunteers	Yes
Eligibility Inclusion Criteria	Chronic non-pulsatile tinnitus
Eligibility Exclusion Criteria	- Hyperacusis - Subjective hearing loss - Objective hearing loss with pure tone average greater than 35 dB sound pressure level (SPL) - Evidence of significant depression or suicidal ideation
Contact	David Pence BA, 217-545-7579, dpence@siumed.edu Carol Bauer MD, 217-545-5140, cbauer@siumed.edu
Locations	United States, Illinois, Southern Illinois University School of Medicine, Springfield, Illinois, United States, 62794
Study chairs or principal investigators	Carol A Bauer MD, Southern Illinois University School of Medicine
Study ID Numbers	05-014
Last Updated	August 16, 2005
Record first received	July 27, 2005
ClinicalTrials.gov Identifier	NCT00124800
Health Authority	United States: Institutional Review Board

Clinical Trial of Acamprosate for Tinnitus

Current status	currently recruiting participants
Sponsors and collaborators	Oregon Health and Science University
Information provided by	Oregon Health and Science University
ClinicalTrials.gov Identifier	NCT00596531
Purpose	The objective of this project is to determine whether acamprosate is more effective at providing relief for tinnitus than a placebo. Acamprosate has been suggested to be effective in reducing tinnitus annoyance in a preliminary study. Study evidence indicates that tinnitus is related to increased excitatory spontaneous brain activities. Acamprosate may help restore the excitatory/inhibitory balance in the brain and thus reduce tinnitus.

	The current study includes three phases. The first phase is an open-label screening study used to identify tinnitus subjects responding to acamprosate. These responding subjects will enter the second phase, which is a double blind, placebo-controlled study aimed at confirming the subjects' responses to acamprosate. In the third phase, clinical parameters of both responders and non-responders will be compared using a multi-linear regression model to determine characteristics that define the sub-group of tinnitus patients that are likely to benefit from acamprosate treatment.
Condition(s)	Tinnitus
Interventions	Drug: Acamprosate Drug: Placebo
Phase	I
Study type and design	Interventional, Treatment, Randomized, Double Blind (Subject, Investigator), Placebo Control, Crossover Assignment, Safety/Efficacy Study
Official title:	Clinical Trial of Acamprosate for Tinnitus
Arms	A: Experimental Subjects taking acamprosate B: Placebo Comparator Subjects taking placeboes
Assigned Interventions	Drug: Acamprosate Oral administration, 666 mg, tid, for 6 months Drug: Placebo Oral administration of 2 pills, tid, for 6 months
Primary Outcomes	Tinnitus Handicap Index Tinnitus loudness score on visual analogue scale Tinnitus annoyance score on visual analogue scale [Time Frame:15 months] [Designated as safety issue:No]
Expected total Enrollment	186
Study start	January 2008
Expected study completion date	December 2010
Expected primary completion date	December 2010 (Final data collection date for primary outcome measure)
Participants (age)	18 Years to 85 Years
Gender	both
Accepts health volunteers	No

Eligibility Inclusion Criteria	- Concurrent treatments: Amplification, sound generators or cochlear implants are permitted, provided they have been in use for at least one year. A four-week washout from any other tinnitus treatment or management program is required prior to entering this study. - Hearing function: All levels of hearing function can be included recognizing that profound, bilateral losses will not be able to perform psychophysical tinnitus and hearing tests but will be able to rate subjective loudness, annoyance and impact on life. - Tinnitus etiology: All forms of tinnitus etiology will be accepted into Phase I providing they meet the following tinnitus criterion. Duration: 1 year or longer. Stability: Constant. Severity: > 50th percentile of OHSU Tinnitus Patients based upon Tinnitus Severity Index (TSI) scores. Rated loudness: > 7 cm from the left on a visual analog scale (VAS) 10 cm in length. Rated annoyance: > 7 cm from the left on a visual analog scale (VAS) 10 cm in length. Tinnitus location: Unrestricted.
Eligibility Exclusion Criteria	- Medical conditions: Active neurologic or otologic disease processes that may impact tinnitus perception. Auto-immune diseases. Pregnancy or planned pregnancy during the study. - Renal function: Subjects with documented renal disorders will be excluded if renal function has creatinine clearance is <50 mL/minute. - Digestive tract problems: Subjects with digestive tract disorders will be excluded. - Psychological status: Beck Depression Inventory score of greater than 15. - Tinnitus duration: Less than 1 year. Stability: pulsatile, intermittent, varying to a high degree in loudness or changing in location of perception. Severity: < 50th percentile of OHSU Tinnitus Patients based upon Tinnitus Severity Index (TSI) scores. Rated loudness: < 7 cm from the left on a visual analog scale (VAS) 10 cm in length. Rated annoyance: < 7 cm from the left on a visual analog scale (VAS) 10 cm in length.
Contact	William H Martin, Ph.D., (503) 494-7954, martinw@ohsu.edu
Locations	United States, Oregon, OHSU, Portland, Oregon, United States, 97239
Study chairs or principal investigators	William H Martin, Ph.D., Oregon Health and Science University
Study ID Numbers	00003412, 00003412
Last Updated	January 8, 2008
Record first received	January 8, 2008
ClinicalTrials.gov Identifier	NCT00596531
Health Authority	United States: Institutional Review Board

Collaborative Tinnitus Research at Washington University (CTRWU)

Current status	currently recruiting participants
Sponsors and collaborators	National Institute on Deafness and Other Communication Disorders (NIDCD)
Information provided by	National Institute on Deafness and Other Communication Disorders (NIDCD)
ClinicalTrials.gov Identifier	NCT00567892
Purpose	The goal of this trial to see if repetitive transcranial magnetic stimulation (rTMS) to the hearing area of the brain can lessen the perception of tinnitus. rTMS uses a strong magnet and when placed against the scalp generates a small electrical field within the brain. Depending on the frequency of the stimulation, this electrical field can either decrease or increase the electrical excitability of the brain. In this study, low-frequency stimulation will be used, which is thought to decrease nerve activity. It is this electrical excitability of the brain that is thought to be responsible for tinnitus. The hypothesis of this study is that rTMS can decrease the perception of tinnitus. Each participant will initially receive either active rTMS or sham rTMS (placebo) for 2 weeks. After the 2 weeks, the participant will rest for 2 weeks. After the 2 week rest, the participant will then receive either active rTMS or sham rTMS, depending on what they received during the first 2 weeks. The order of the treatments received will be randomly selected and the participant will not be told which treatment they are receiving. Each participant will undergo magnetic resonance imaging (MRI) and positive emission tomography (PET) scanning of the brain at the beginning of the study and after each treatment.
Condition(s)	Subjective Tinnitus
Interventions	Device: rTMS
Phase	II, III
Study type and design	Interventional, Treatment, Randomized, Single Blind (Subject), Placebo Control, Crossover Assignment, Safety/Efficacy study
Official title:	Collaborative Tinnitus Research at Washington University
Arms	1. rTMS: Experimental Stimulation Settings: Frequency -- 1Hz on 330 sec (5 min 30 sec.) per train for the first 5 trains with the last train 350 sec. (5 min. 50 sec.) in duration Off -- 90 sec (1 min. 30 sec.) Intensity -- 110% of motor threshold Duration -- 42½ minutes (total 2000 pulses in 6 trains) 2. Sham: Sham Comparator Sham appears identical to and mimics sounds and sensations of active magnet.

Assigned Interventions	1. Device: rTMS Stimulation Settings: Frequency -- 1Hz on 330 sec (5 min 30 sec.) per train for the first 5 trains with the last train 350 sec. (5 min. 50 sec.) in duration Off -- 90 sec (1 min. 30 sec.) Intensity -- 110% of motor threshold Duration -- 42½ minutes (total 2000 pulses in 6 trains) 2. Device: rTMS Stimulation Settings: Frequency -- 1Hz on 330 sec (5 min 30 sec.) per train for the first 5 trains with the last train 350 sec. (5 min. 50 sec.) in duration Off -- 90 sec (1 min. 30 sec.) Intensity -- 110% of motor threshold Duration -- 42½ minutes (total 2000 pulses in 6 trains)
Primary Outcomes	The primary outcome measure is defined as the change in the Tinnitus Handicap Inventory score between active rTMS and sham rTMS. [Time Frame: 8 weeks] [Designated as safety issue: No]
Secondary Outcomes	Participant's response to the Patient Global Impression of Change question to be completed at the end of each treatment arm. Participants will also be asked if they would continue treatment and if they would recommend this treatment to a friend. [Time Frame: 12 weeks] [Designated as safety issue: No]
Expected total Enrollment	55
Study start	January 2008
Expected study completion date	December 2012
Expected primary completion date	December 2012 (Final data collection date for primary outcome measure)
Participants (age)	18 Years to 60 Years
Gender	both
Accepts health volunteers	No
Eligibility Inclusion Criteria	On-line eligibility screening: http://tinnitus.wustl.edu/ - Men and women between the ages of 18 and 60 years. - Subjective, unilateral or bilateral, non-pulsatile tinnitus of 6 month's duration or greater. - Tinnitus Handicap Inventory (THI) score of 38 or greater. - Subjects of child-bearing potential using an appropriate form of birth control acceptable to the research team and with a negative urine pregnancy test or undergone sterilization procedure. - Able to give informed consent. - Available for once daily therapy, during working hours, Mon.-Fri. - English-speaking
Eligibility Exclusion Criteria	- Patients experiencing tinnitus related to cochlear implantation, retrocochlear lesion, or other known anatomic/structural lesions of the ear and temporal bone. - Patients with hyperacusis or misophonia (hyper-sensitivity to loud noises).

	- History of seizures, history of loss of consciousness requiring medical care, any other CNS pathology that increases a subject's risk for treatment with rTMS. - Patients with cardiac pacemakers, intracardiac lines, implanted medication pumps, implanted electrodes in the brain, other intracranial metal objects with the exception of dental fillings, or any other contraindication for MRI scan. - Any contraindication for receiving FDG PET, as determined by established clinical criteria. - Patients with an acute or chronic unstable medical condition which, in the opinion of the investigator, would require stabilization prior to initiation of magnetic stimulation. - Patients with any active ear disease that, in the opinion of the PI, needs to be further evaluated. - Patients with symptoms of depression as evidenced by a score of 14 or greater on the Beck Depression Inventory or, in the opinion of the psychiatric sub-investigator demonstrates active mood symptoms that meet DSM-IV-TR criteria for Major Depressive Disorder. - Any psychiatric co-morbidity that, in the opinion of the psychiatric sub-investigator, may complicate the interpretation of study results. - Pregnancy - Currently breast-feeding - Previous treatment with rTMS - Patients with tinnitus related to Workman's Compensation claim or litigation-related event. - Patients with a history of diabetes. - Fasting glucose > 150mg/Dl. - Patients taking any medication(s), in the opinion of the investigator, that is(are) deemed to be etiologically related to the development of tinnitus. - Unable to elicit a motor threshold with rTMS. - A Mini-Mental Status Exam score less than 27. - Untreated or newly diagnosed hypertension, (systolic blood pressures above 140 mm or diastolic pressure above 90 mm). - Patients with a history of claustrophobia. - Inability to lay flat for 2 hours. - Active alcohol and/or drug dependence or history of alcohol and/or ETOH dependence within the last year. - Any medical condition that, in the opinion of the investigators, confounds study results or places the subject at greater risk. - Unable to provide informed consent. - Any exclusions from radiology screening for MRI or PET scanning

Contact	Joyce Nicklaus, RN, BSN, 314.362.7508, nikalusj@ent.wustl.edu
Locations	United States, Missouri, Washington University Medical Center, St. Louis, Missouri, United States, 63110
Study chairs or principal investigators	Jay F Piccirillo, MD, Washington University School of Medicine
Study ID Numbers	07-0689, R01DC009095
Last Updated	October 7, 2008
Record first received	December 3, 2007
ClinicalTrials.gov Identifier	NCT00567892
Health Authority	United States: Federal Government

Efficacy, Safety and Tolerability of Neramexane in Comparison to Placebo in Patients With Subjective Tinnitus

Current status	currently recruiting participants
Sponsors and collaborators	Merz Pharmaceuticals GmbH
Information provided by	Merz Pharmaceuticals GmbH
ClinicalTrials.gov Identifier	NCT00772980
Purpose	The purpose of this study is to investigate the safety and efficacy of neramexane mesylate in the treatment of subjective tinnitus in comparison to placebo.
Condition(s)	Subjective Tinnitus
Interventions	Drug: Neramexane mesylate Drug: Placebo
Phase	III
Study type and design	Interventional; Treatment, Randomized, Double Blind (Subject, Investigator, Outcomes Assessor), Placebo Control, Parallel Assignment, Safety/Efficacy Study
Official title:	A Randomized, Double-Blind, Placebo-Controlled, Clinical Evaluation of the Efficacy, Safety and Tolerability of Neramexane in Patients With Subjective Tinnitus
Arms	1: Experimental Drug: Neramexa mesylate Double-blind treatment period of 17 weeks up to 75 mg Neramexane mesylate per day 2: Placebo Comparator Drug: Placebo Double-blind treatment period of 17 weeks placebo

Assigned Interventions	1. Drug: Neramexane mesylate Double-blind treatment period of 17 weeks up to 75 mg Neramexane mesylate per day, 12 weeks follow-up. 2. Drug: Placebo Double-blind treatment period of 17 weeks placebo, 12 weeks follow-up.
Primary Outcomes	TBF-12 (Tinnitus-Beeinträchtigungs-Fragebogen-12 “Tinnitus Handycap Inventory-12”) total score change from baseline to end of treatment [Time Frame: Screening, Baseline, week 5, 13, 17] [Designated as safety issue: No]
Secondary Outcomes	TBF-12 factorial scores, individual respond rate, Tinnitus Rating Scale, Sleep Questionnaire, Qualitiy Of Life, safety parameters, population pharmacokinetics, optional pharmacogenetics
Expected total Enrollment	400
Study start	October 2008
Participants (age)	18 Years to 75 Years
Gender	both
Accepts health volunteers	No
Eligibility Inclusion Criteria	patients aged 18 to 75 years with a clinical diagnosis of first onset, persistent (i.e. tinnitus sghould never be absent for >24 hours in a row), subjective, uni-or bilateral tinntius present for at least 3 months but not more than 12 months.
Eligibility Exclusion Criteria	- Clinical diagnosis of intermittent or pulsatile tinnitus - Patients who have tinnitus as a concomitant symptom of an otological/neurological disease(such as otitis media, Meniére´s disease, otosclerosis, etc.)
Contact	Clariness Clariness, tinnitus@clinlife.net
Locations	Netherlands, Andromed Rotterdam, Rotterdam, Netherlands, HC 3021, Roos Choudhurry, Dr, 0031-10-4480 ext 800, arts@andromed.nl
Study chairs or principal investigators	Roos Choudhurry, Dr, Andromed Rotterdam
Study ID Numbers	MRZ 92579/TI/3002, EudraCT Number 2008-000639-16
Last Updated	October 14, 2008
Record first received	October 13, 2008
ClinicalTrials.gov Identifier	NCT00772980
Health Authority	Netherlands: The Central Committee on Research Involving Human Subjects (CCMO)

Brain Imaging of Tinnitus

Current status	is ongoing, but not recruiting
Sponsors and collaborators	National Institutes of Health Clinical Center (CC)
Information provided by	National Institutes of Health Clinical Center (CC)
ClinicalTrials.gov Identifier	NCT00359931
Purpose	This study will use magnetic resonance imaging (MRI) to compare brain function in three groups of people: hearing-impaired people with tinnitus; hearing-impaired people without tinnitus; and people with normal hearing and without tinnitus. Also known as “ringing in the ears,” tinnitus is the false sensation of sounds. Adults between 30 and 65 years of age who meet the following criteria may be eligible for this study: - Mild to moderate hearing loss who have experienced tinnitus daily for at least 1 year - Mild to moderate hearing loss who have never or rarely experienced tinnitus - Normal hearing who have never or rarely experienced tinnitus Candidates are screened with a medical history and questionnaires. Participants have a detailed hearing test to measure hearing and the nature of tinnitus. In a second visit, subjects have a brief physical examination, followed by MRI scanning. MRI uses a magnetic field and radio waves to produce images of body tissues and organs. For this procedure, the subject lies on a table that can slide in and out of the scanner (a narrow cylinder), wearing earplugs to muffle loud knocking and thumping sounds that occur during the scanning process. The subject may be asked to lie still for up to 8 minutes at a time. During the MRI, the subject performs computer-based tasks that involve listening to sounds. Another hearing test is done after the MRI.
Condition(s)	Tinnitus Hearing Loss
Study type and design	Observational; other
Official title:	Neural Modeling and Brain Imaging of Tinnitus
Detailed Description	Subjective tinnitus, the false perception of sound in the absence of an acoustic stimulus, occurs frequently as a consequence of noise-induced deafness. The purpose of this study is to investigate the brain sites and mechanisms underlying tinnitus using a combined mathematical modeling and functional brain imaging experimental approach. Although studies have focused on the neural bases of tinnitus, it is not known why tinnitus arises only in certain cases of hearing loss, and the contribution of different brain regions in tinnitus perception is poorly understood. This in turn, prevents the development of better studies and new treatment methods for tinnitus. The primary hypothesis is that a network of brain regions, from auditory processing areas to emotional processing areas,

	contributes to, and modulates, tinnitus perception. The brain imaging study will be used to study differences in the network of brain regions involved in listening and discriminating sounds for tinnitus sufferers as compared to a control group of subjects with similar hearing loss but without tinnitus. This comparison should permit the identification of brain regions most active in tinnitus. An age matched control group without hearing loss and tinnitus will be included to determine those effects due to hearing loss alone. The mathematical computational modeling will use a previously developed large-scale neural network model of auditory processing in the cerebral cortex, which will be modified to induce tinnitus via different neural mechanisms. The modeling study should allow us to evaluate the contribution of different cortical regions and mechanisms to tinnitus perception; some changes in the model will be more successful than others in inducing tinnitus and in matching simulated brain imaging data with experimental brain imaging data. The modeling study will use the same stimuli and experimental paradigm as the functional brain imaging study. Comparing the experimental and modeling results will provide hypotheses about the most likely mechanism mediating tinnitus. Together, the modeling and experimental studies will advance our knowledge of the brain regions and mechanisms underlying tinnitus.
Expected total Enrollment	80
Study start	July 2006
Participants (age)	30 Years to 65 Years
Gender	both
Accepts health volunteers	Yes
Eligibility Inclusion Criteria	Plus Tinnitus Plus Hearing loss subjects. - Adults, between the ages of 30 to 65 years. - Are able to hear and perceive sounds used in the experiment in the range 250 Hz to 2 KHz and have high-frequency sensorineural hearing loss beginning no lower than 2 KHz. - In good health and not currently taking certain medications regularly (e.g. antidepressants, antiseizure medications, antipsychotics, etc.). - Experience tinnitus daily. - Have had non-pulsatile tinnitus for at least 1 year. - Have bilateral or bilateral with unilateral dominance tinnitus. Minus Tinnitus Plus Hearing loss subjects. - Adults, between the ages of 30 to 65 years. - Are able to hear and perceive sounds used in the experiment in the range 250 Hz to 2 KHz and have high-frequency sensorineural hearing loss beginning no lower than 2 KHz. - In good health and not currently taking certain medications regularly (e.g. antidepressants, antiseizure medications, antipsychotics, etc.). - Have never or rarely (i.e. transient episodes experienced by virtually everyone) experienced tinnitus.

	Minus Tinnitus Minus Hearing loss subjects or normal volunteers. - Adults, between the ages of 30 to 65 years. - Have normal hearing. In good health and not currently taking certain medications regularly (e.g. antidepressants, antiseizure medications, antipsychotics, etc.).
Eligibility Exclusion Criteria	- Subjects who have pacemakers, aneurysm clips, metallic prostheses or shrapnel fragments. - Subjects incapable of giving informed consent. - Subjects with a positive pregnancy test. - Children below the age of 18 years. - Subjects with hyperacusis or misophonia (hyper-sensitivity to loud noises). - Subjects with mood disturbances such as depression or anxiety. - Subjects with a history of temporomandibular joint problems or who present symptoms of pain and tenderness of the temporomandibular joint on examination. Subjects may be excluded for the following reasons that may cause difficulty with interpretation of the imaging data: - Subjects with mental or physical illnesses, other than tinnitus that may cause problems with participation in the study. - Subjects with current uncontrolled hypertension, or significant past history of cardiovascular disease and diabetes melitus. - Subjects with a history of head trauma with loss of consciousness, epilepsy, seizures, a history of chemotherapy (neurotoxic or ototoxic) and other medical conditions that may alter cerebral functioning. - Subjects who are taking or have a history of taking recreational drugs or alcoholism. Subjects with unilateral or asymmetrical hearing loss who have not had (or cannot provide documentation of) comprehensive neuro-otologic workup will be excluded.
Contact	Please refer to this study by its ClinicalTrials.gov identifier: NCT00359931
Locations	United States, Maryland, National Institutes of Health Clinical Center, 9000 Rockville Pike, Bethesda, Maryland, United States, 20892
Publications	Mirz F, Gjedde A, Sødkilde-Jrgensen H, Pedersen CB. Functional brain imaging of tinnitus-like perception induced by aversive auditory stimuli. Neuroreport. 2000 Feb 28;11(3):633-637. Giraud AL, Chéry-Croze S, Fischer G, Fischer C, Vighetto A, Grégoire MC, Lavenne F, Collet L. A selective imaging of tinnitus. Neuroreport. 1999 Jan 18;10(1):1-5. Mirz F, Gjedde A, Ishizu K, Pedersen CB. Cortical networks subserving the perception of tinnitus--a PET study. Acta Otolaryngol Suppl. 2000;543:241-243:
Study ID Numbers	060218, 06-DC-0218
Last Updated	October 16, 2008

Record first received	• August 2, 2006
ClinicalTrials.gov Identifier	• NCT00359931
Health Authority	United States: Federal Government

Countering Stimulus-Induced Alpha-Desynchronization to Treat Tinnitus

Current status	enrolling participants by invitation only
Sponsors and collaborators	University of Konstanz
Information provided by	University of Konstanz
ClinicalTrials.gov Identifier	NCT00748475
Purpose	The purpose of the study is to examine the effect of alpha-neurofeedback while subjects listen to a noise on tinnitus.
Condition(s)	Tinnitus
Interventions	Behavioral: Neurofeedback
Study type and design	Interventional; Treatment, Non-Randomized, Open Label, Single Group Assignment, Efficacy Study
Official title:	Countering Stimulus-Induced Alpha-Desynchronization to Treat Tinnitus
Expected total Enrollment	10
Study start	September 2008
Expected study completion date	May 2009 (Final data collection date for primary outcome measure)
Participants (age)	18 Years to 70 Years
Gender	both
Accepts health volunteers	No
Eligibility Inclusion Criteria	- Duration of Tinnitus >= 6 months and <= 20 years - Subjective Tinnitus
Eligibility Exclusion Criteria	History of neurological or more than mild psychiatric diseases
Contact	Nathan Weisz, University of Konstanz
Locations	University of Konstanz
Study chairs or principal investigators	Thomas Hartmann, Dipl.-Psych., Nathan Weisz PhD, University of Konstanz

Study ID Numbers	TE0602-1
Last Updated	September 5, 2008
Record first received	September 5, 2008
ClinicalTrials.gov Identifier	NCT00748475
Health Authority	Germany: Ethics Commission

Study of Low Level Laser Therapy and Word Recognition in Hearing Impaired Individuals

Current status	completed
Sponsors and collaborators	Erchonia Medical, Inc.
Information provided by	Erchonia Medical, Inc.
ClinicalTrials.gov Identifier	NCT00787189
Purpose	The purpose of this clinical study is to determine the effectiveness of low level laser light therapy when applied around the head and ears in improving unaided word recognition in ears with sensorineural hearing loss.
Condition(s)	Sensorineural Hearing Loss
Interventions	Device: The Hearing Laser Device: Placebo Laser
Study type and design	Interventional; Treatment, Randomized, Double Blind (Subject, Investigator, Outcomes Assessor), Placebo Control, Parallel Assignment, Safety/Efficacy Study
Official title:	The Effects of the Erchonia Hearing Laser on Word Recognition in Hearing Impaired Individuals Clinical Study Protocol
Arms	A: Active Comparator Active and placebo laser devices B: Placebo Comparator Active and placebo laser devices
Assigned Interventions	A: Device: The Hearing Laser Two 6-minute low level laser light applications to the head/neck/ears region, each one week apart. B: Device: Placebo Laser
Detailed Description	Sensorineural hearing loss accounts for about 90% of all hearing loss and is found in 23% of individuals older than 65 years. Sensorineural hearing loss occurs when the hair cells of the inner ear and the neural pathways to the auditory cortex are damaged. In most cases, sensorineural hearing loss cannot be improved, reversed or 'cured.' Current treatment options focus on methods that amplify external sounds and on teaching the patient various strategies to 'retrain' the brain to interpret external stimuli.

	Low Level Laser Therapy was first applied for the treatment of inner ear diseases by Uwe Witt, MD of Hamburg, Germany in the 1980's. Hearing impaired patients have inflammation and/or atrophy of the tissues and neural pathways connected to and supporting the cochlea's cilia hair structure, the hearing mechanism of the inner ear. Low level laser therapy is believed to stimulate the mitochondria of the adipocyte cells, which subsequently increases the production of ATP. The resultant surge in ATP production works to repair damaged tissue and regenerate cells reversing some of the damage incurred to the cochlea and thus improving aspects of hearing function.
Primary Outcomes	word recognition scores [Time Frame: one week] [Designated as safety issue: No]
Secondary Outcomes	tinnitus, hearing-related quality of life [Time Frame: up to 6 months] [Designated as safety issue: No]
Expected total Enrollment	70
Study start	August 2007
Expected study completion date	June 2008
Expected primary completion date	June 2008 (Final data collection date for primary outcome measure)
Participants (age)	18 Years and older
Gender	both
Accepts health volunteers	Yes
Eligibility Inclusion Criteria	- Sensorineural hearing loss. - Mild or greater degree. - Adult onset. - Gradual onset. - Hearing loss stable over past 12 months. - Etiology of presbyacusis or noise-induced hearing loss. - Unaided word recognition score between 28% and 86%. - English as primary spoken language. - Willing and able to abstain from other treatments or medications to improve hearing ability. Willing and able to abstain from work or other activities that involve loud noise exposure.
Eligibility Exclusion Criteria	- Central auditory processing disorder. - Active/recurrent middle ear infection. - Meniere's disease. - Tympanic membrane perforation/tubes. - Cochlear implant. - Removal of acoustic neuroma

	- Hyperacusis/misphonia. - Photosensitivity disorder. - Active infection/wound in head/ear region. - Pregnant/lactating. - Serious mental health illness. - Significant developmental disability/cognitive impairment. - History of drug/alcohol abuse. - Involvement in litigation/worker's compensation/disability benefits for hearing loss. - Other research participation in past 90 days. - Use of ototoxic medications known to cause temporary or permanent hearing loss.
Contact	Please refer to this study by its ClinicalTrials.gov identifier: NCT00787189
Locations	United States, California, McDonald Hearing Centers, Sacramento, California, United States, 95818
Study chairs or principal investigators	Betty McNamara, M.S., CCC-A, Maryjane Rees Language Speech & Hearing Center
Responsible party	Erchonia Medical, Inc. (Steven Shanks, President)
Study ID Numbers	EHL-001, HMED-001
Last Updated	November 6, 2008
Record first received	November 6, 2008
ClinicalTrials.gov Identifier	NCT00787189
Health Authority	United States: Food and Drug Administration; United States: Institutional Review Board

Does Aspirin Have a Protective Role Against Chemotherapeutically Induced Ototoxicity?

Current status	not yet open for participant recruitment
Sponsors and collaborators	University Health Network, Toronto
Information provided by	University Health Network, Toronto
ClinicalTrials.gov Identifier	NCT00578760
Purpose	Aspirin (ASA) has been shown, in an animal model, to attenuate the ototoxic properties of cisplatin. The researchers plan to investigate this in patients undergoing cisplatin chemotherapy. The researchers hypothesise that low-dose aspirin can prevent cisplatin induced ototoxicity in the clinical setting.

Condition(s)	Hearing Loss Ototoxicity
Interventions	Drug: aspirin Drug: placebo
Study type and design	Interventional; Prevention, Randomized, Double Blind (Subject, Caregiver, Investigator, Outcomes Assessor), Placebo Control, Parallel Assignment
Official title:	Does Aspirin Have a Protective Role Against Chemotherapeutically Induced Ototoxicity?
Arms	1: Experimental 325mg ASA OD during course of chemotherapy 2: Placebo Comparator placebo OD during course of chemotherapy
Assigned Interventions	1: Drug: aspirin 325mg ASA OD for the duration of the cisplatin 2: Drug: placebo OD for course of cisplatin chemotherapy
Detailed Description	Cisplatin has the highest ototoxic potential of all platinum containing compounds. It is used in the treatment of squamous cell carcinoma of the head and neck, germ cell tumours of the testis and bladder carcinoma. 42% of 400 patients receiving high-dose cisplatin (70-85 mg/m2, median cumulative dose 420mg) experienced common toxicity criteria (CTC: appendix 1) grade 3 or 4 symptoms (De Jongh 2003). Ototoxicity is dose related: 75-100% of patients receiving a very high dose and 20-40% with a low dose regime will develop significant ototoxic symptoms. In one study, 50% of head and neck cancer patients treated with cisplatin develop ototoxicity (Blakley 1994). Cisplatin ototoxicity can present as a variable collection of symptoms and signs. These include bilateral and symmetrical hearing loss that is permanent and irreversible. High frequency sensorineural hearing loss with progression towards lower frequencies. Tinnitus, that is also permanent and irreversible. There are a number of known factors that can predispose to cisplatin ototoxicity. They include: Dose, duration and mode of administration, age extremes, previous or concurrent cranial irradiation, previous history of hearing loss, renal disease, concomitant use of other ototoxic drugs, noise exposure with concomitant cisplatin administration, decreased serum albumin level, low hemoglobin level, low red blood cell count and a low haematocrit. Interestingly, cisplatin ototoxicity is considered to be exclusively confined to the cochlear, the vestibular system is unaffected (Myers 1993). Ototoxicity from chemotherapeutic agents is due, in part, to reactive oxygen species. Reactive oxygen species can be attenuated by antioxidants. Salicylates are antioxidants that can be administered as aspirin. It has been shown, in an animal model, that aspirin can protect hearing from cisplatin induced ototoxicity (Li 2002). In this set of experiments, the rat was used to evaluate the protective role of aspirin in both the acute and chronic setting. Auditory evoked brain stem

	responses were used to determine pre- and post-intervention hearing thresholds. In the acute experiments (n=23), one dose of cisplatin (16mg/kg) was administered and the animals were given aspirin (100mg/kg) starting the day before cisplatin treatment and continuing 4 days thereafter. There was a significant difference in hearing thresholds between the treatment and control groups at 3, 8 and 14kHz. In the chronic experiments cisplatin was given on days 1, 4 and 7 (5mg/kg). Aspirin was given from 2 days before to 3 days after cisplatin treatment (100mg/kg bd). The hearing thresholds were compared before the first dose and 10 days after the last treatment. In those animals treated concurrently with aspirin, their hearing did not differ form control animals at 16 and 24 kHz. This was correlated to a significant reduction in inner hair cell loss from 20% (cisplatin) to 8% (cisplatin and aspirin). Salicylates also protected renal function as determined by both plasma blood urea nitrogen and creatinine levels. Salicylates did not affect tumour mass or metastasis. The rats were inoculated with malignant breast cancer cells (metastatic mammary adenocarcinoma). Aspirin protected against cisplatin-induced ototoxicity, without affecting the oncolytic action of the cisplatin. Gentamicin and cisplatin both have a similar ototoxic mechanism of action. Aspirin has been shown to prevent gentamicin-induced hearing loss without compromising its anti-bacterial efficacy in both animal models and the clinical setting (Sha 2006, Chen 2007). Sha's group reported a prospective, randomized, double-blind trial with 200 patients. The patients all required gentamycin for clinical indications. In the 'treatment' arm of the study, the patients also received aspirin (1g tds for 14 days). A significant difference in hearing was shown at 6 and 8kHz of >15dB if aspirin was not given.
Primary Outcomes	hearing loss [Time Frame: before and after chemotherapy] [Designated as safety issue: No]
Secondary Outcomes	hearing loss and tinnitus questionnaires [Time Frame: before and after cisplatin treatment] [Designated as safety issue: No]
Expected total Enrollment	110
Study start	February 2008
Expected study completion date	February 2010
Participants (age)	18 Years and older
Gender	both
Accepts health volunteers	No
Eligibility Inclusion Criteria	- Patients undergoing cisplatin treatment for the following malignancies: o germ-cell o bladder o head and neck (Only head and neck patients requiring only 2 cycles of post-operative chemo-radiotherapy, and therefore not requiring a gastrostomy tube, will be enrolled.)

	- Over 18 years of age - Normal otoscopic examination - Informed consent
Eligibility Exclusion Criteria	Patients with the following will be excluded: - Not able to grasp the study implications or unable to consent. - History of peptic ulcer disease - Severe renal impairment (U&E, Cr clearance) - Haemophilia - Severe hepatic impairment - Cerebrovascular haemorrhage - Acute gout - Hypersensitivity to NSAIDs
Contact	Emma Barker, FRCS, PhD, 001-416-946-4501 ext 4353, emmabarker@doctors.org.uk
Locations	Canada, Ontario, Princess Margaret Hospital, University Health Network, Toronto
Responsible party	UNH (Dr John Rutka)
Study ID Numbers	Aspirin-01
Last Updated	December 19 2007
Record first received	December 18, 2007
ClinicalTrials.gov Identifier	NCT00578760
Health Authority	United States: Food and Drug Administration

Source: ISRCTN Register

Phase out as a treatment for chronic untreatable tinnitus: a double blind crossover trial

Current status	ongoing
Sponsors and collaborators	University Medical Centre Groningen (UMCG) (The Netherlands)
Information provided by	University Medical Centre Groningen (UMCG) (The Netherlands)
Source of record ID	ISRCTN17631678
Condition(s)	Tinnitus
Study type and design	Randomised, placebo controlled, crossover, double blinded trial

Official title:	Phase out as a treatment for chronic untreatable tinnitus: a double blind crossover trial
Interventions	A subject will receive Phase Out treatment for thirty minutes three times a week for one week and placebo sound treatment on the same regime during another. One month interval is in between these two sets of treatment. If a treatment is started, the subject fills in a report mark on the "tinnitus loudness" and "tinnitus annoyance" in the tinnitus diary every evening till three weeks after the treatment session. One week after each week of therapy a subject receives the evaluating questionnaires and will send them back after filling in.
Detailed Description	This study examines the effect of the Phase Out treatment on chronic, incurable tinnitus in adult subjects in comparison with placebo sound. The expectation of this study is that Phase Out treatment is effective for a longer duration and results in increased residual inhibition than placebo sound.
Primary Outcomes	The major aim of this study is disappearance (report mark) of the tinnitus lasting many hours (time). Outcomes will be measured at weeks five and nine.
Secondary Outcomes	Besides the major aims, different questionnaires will be used to determine for which kind of tinnitus patients, this treatment is most effective: 1. Tinnitus Handicap Inventory (THI) 2. Tinnitus Reaction Questionnaire (TRQ) 3. Vital Exhaustion (VE) questionnaire 4. Hospital Anxiety and Depression Scale (HADS) 5. Short Form questionnaire (SF-36) 6. Eysenck Personality Questionnaire 7. Type D Personality Scale 8. Social Support Questionnaire (SSQ) 9. Tinnitus Coping Style Questionnaire (TCSQ) Outcomes will be measured at weeks five and nine.
Expected total Enrollment	60
Study start	01/05/2007
Expected study completion date	01/05/2009
Participants (age)	18 years and older
Gender	both
Eligibility Inclusion Criteria	1. Subjects greater than 18 years 2. Unilateral or bilateral tinnitus 3. Predominant tone tinnitus by history 4. Tinnitus for minimum of three months

Eligibility Exclusion Criteria	1. Acoustic neurinoma 2. Aortic/outflow tract stenosis 3. Pulsatile tinnitus 4. Pregnancy 5. Inability to correct use of test equipment: unable to cooperate during audiologic examination 6. Known tinnitus etiology, which would demand other treatment 7. Hearing loss greater than 60 decibel compared with standardised normal hearing on standard frequencies of a tone audiogram (250, 500, 1000, 2000, 4000 and 8000 hertz)
Contact	Dr K M Heijneman, Universitair Medisch Centrum Groningen, Afd. Keel-,Neus-, Oorheelkunde, P.O. Box 30001, Groningen, Netherlands, 9700 RB, phone 0031 (0)50 361 8053; k.m.heijneman@kno.umcg.nl
Locations	The Netherlands
Study ID Numbers	N/A
Record first received	11/04/2007
ISRCTN Register	ISRCTN17631678