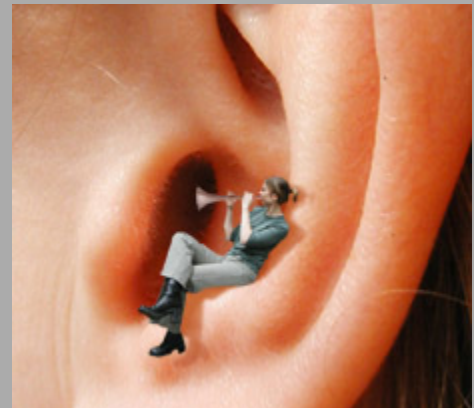


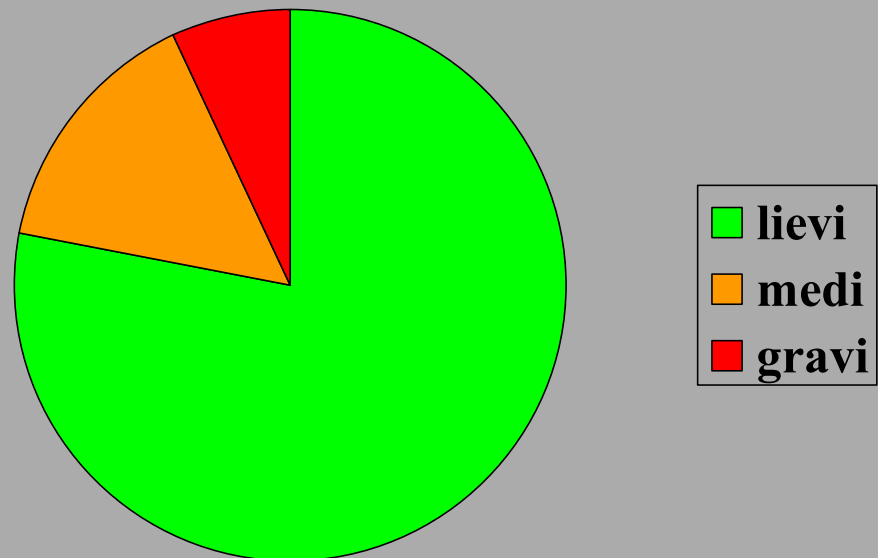
ACUFENI SOGGETTIVI

Sensazione sonora, rumore o tono, percepita in una o entrambe le orecchie o all'interno del cranio, in assenza di una sorgente esterna

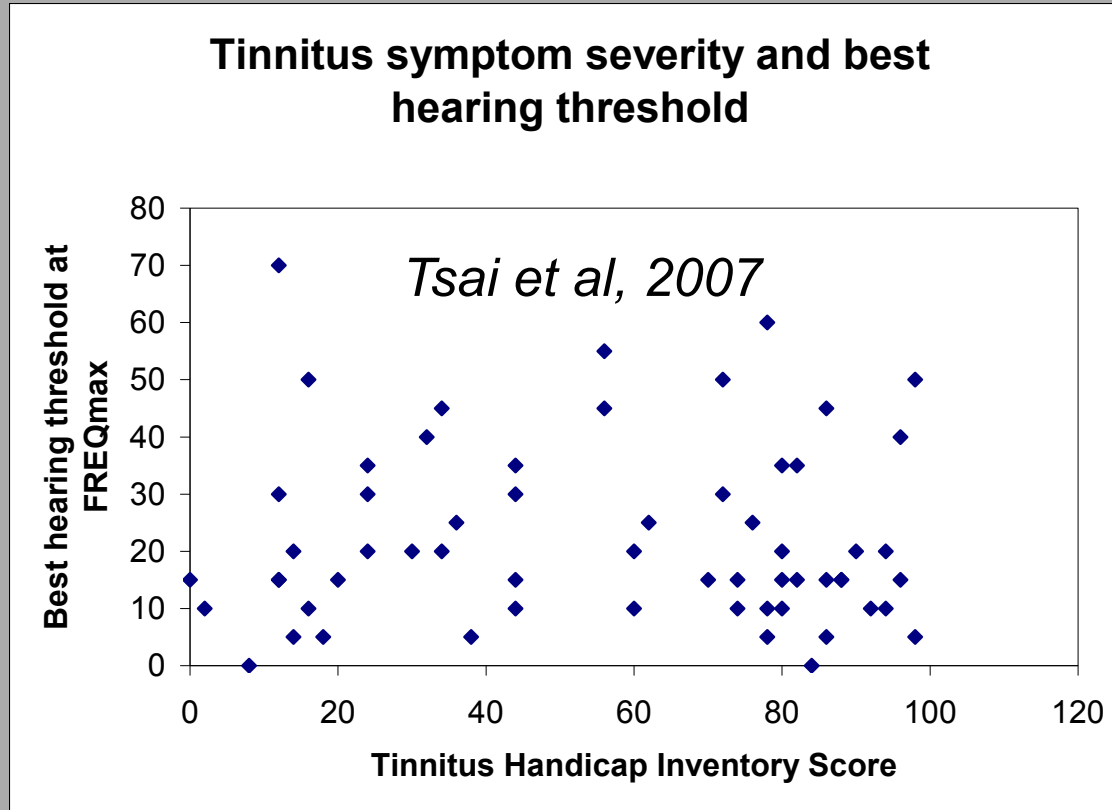


- Prevalenza degli acufeni nell'anziano molto variabile (25-45% negli studi più attendibili)
- Il 5-10% soffre di acufeni gravi

*(Sataloff et al, 1987; Rosenhall et al, 1991;
De Carmo et al, 2008)*



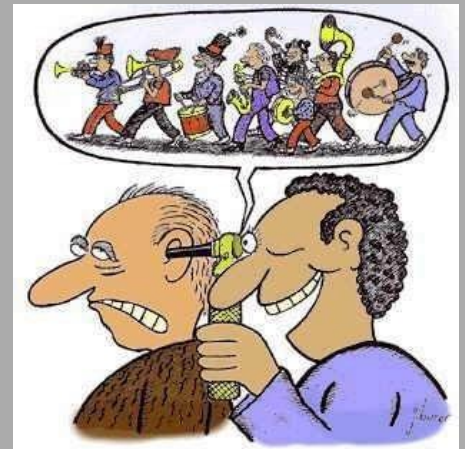
Acufeni e presbiacusia



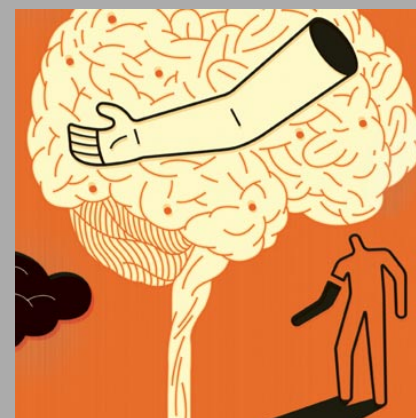
Prevalenza degli acufeni (non la gravità) correlata alla severità dell' ipoacusia

Dove sono generati gli acufeni?

Sebbene originati da una disfunzione del sistema uditivo periferico (coclea / nervo cocleare) gli acufeni sono spesso generati da anomalie fisiopatologiche a livello del sistema nervoso centrale



Acufene centrale ?



- Molte forme di acufeni sono assimilabili a una sensazione “fantasma”
- Acufeni dopo sezione del nervo acustico (ad es. nella chirurgia del neurinoma dell’acustico)
- La percezione degli acufeni in alcuni pazienti è modificata da stimolazioni somatosensoriali

Riorganizzazione centrale

Il SNC reagisce alla mancanza di neurostimolazione dalla periferia uditiva:

- iperattività dei nuclei e delle vie uditive ascendenti, in particolare del collicolo inferiore (*Møller, 1995; Cacace et al, 1995; Coles, 1995*)
- invasione delle aree corticali deafferentate da parte di stimoli neurali provenienti da porzioni sane della coclea (*Salvi et al, 1998*)



Riorganizzazione centrale

Danno cocleare



Ridotto input al
SNC



Riorganizzazione/
iperattività di aree
del SNC



Sensazione
uditiva fantasma

Riorganizzazione centrale

Danno cocleare



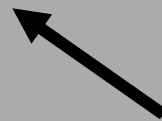
Ridotto input al
SNC



Riorganizzazione/
iperattività di aree
del SNC



Sensazione
uditiva fantasma



Modulazione da
sensazioni / attività
(suoni, movimenti
facciali, stimolazione
sensoriale extrauditiva)

Riorganizzazione centrale

Danno cocleare



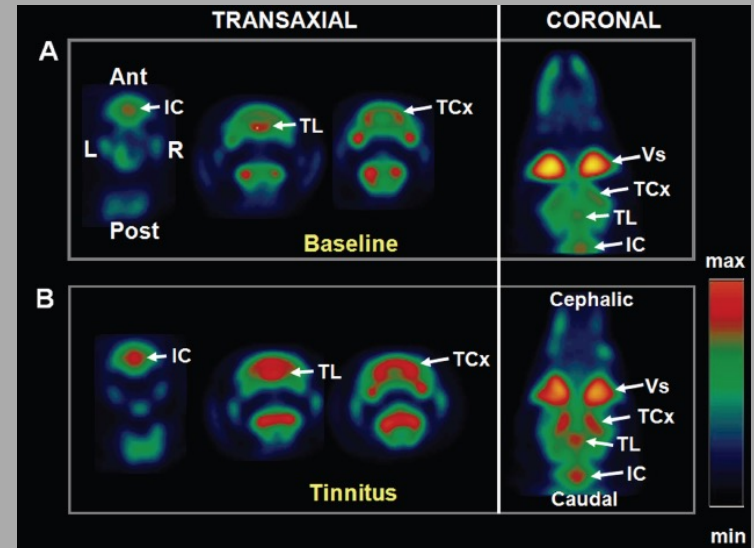
Ridotto input al
SNC



Riorganizzazione/
iperattività di aree
del SNC



Sensazione
uditiva fantasma



Modulazione da
sensazioni / attività
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facciali, stimolazione
sensoriale extrauditiva)

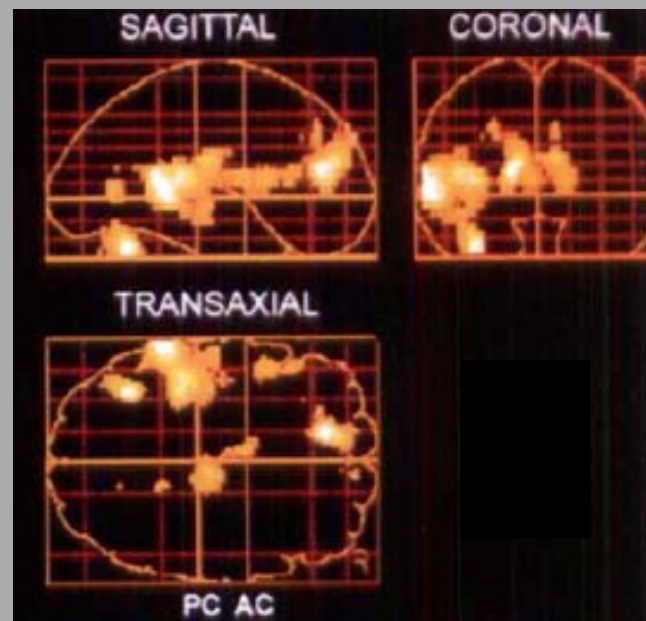
The functional neuroanatomy of tinnitus

Evidence for limbic system links and neural plasticity

A.H. Lockwood, MD; R.J. Salvi, PhD; M.L. Coad, BA; M.L. Towsley, MA;
D.S. Wack, MA; and B.W. Murphy, MS

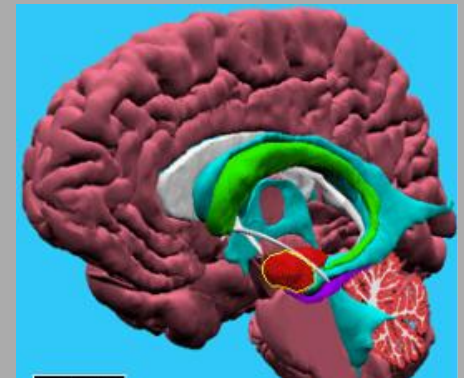
Article abstract—We used PET to map brain regions responding to changes in tinnitus loudness in four patients who could alter tinnitus loudness by performing voluntary oral facial movements (OFMs). Cerebral blood flow was measured in four patients and six controls at rest, during the OFM, and during stimulation with pure tones. OFM-induced loudness changes affected the auditory cortex contralateral to the ear in which tinnitus was perceived, whereas unilateral cochlear stimulation caused bilateral effects, suggesting a retrocochlear origin for their tinnitus. Patients, compared with controls, showed evidence for more widespread activation by the tones and aberrant links between the limbic and auditory systems. These abnormal patterns provide evidence for cortical plasticity that may account for tinnitus and associated symptoms. Although audiologic symptoms and examinations of these patients were typical, the unusual ability to modulate tinnitus loudness with an OFM suggests some caution may be warranted in generalizing these findings.

NEUROLOGY 1998;50:114–120



Acufeni e sistema limbico

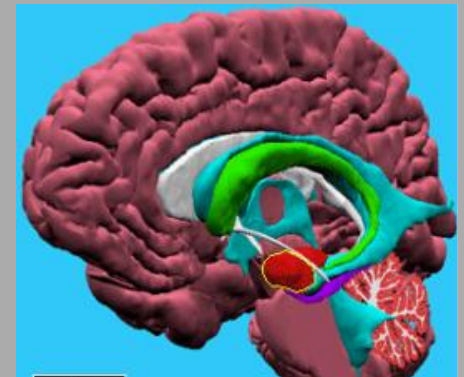
- L'amigdala riceve input dal sistema uditivo
- Coinvolta nella sensazione paura e in altre alterazioni dell'umore (depressione, fonofobia, panico)



Acufeni e sistema limbico

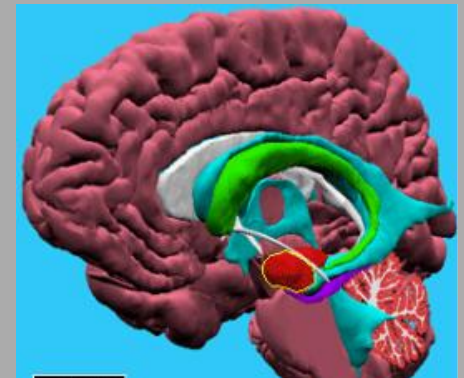
L'acufene severo è spesso accompagnato da un'alterata percezione sonora

- ✓ distorsione sonora
- ✓ ridotta tolleranza ai suoni (*iperacusia*)
- ✓ dolore e paura prodotti dai suoni (*fonofobia*)



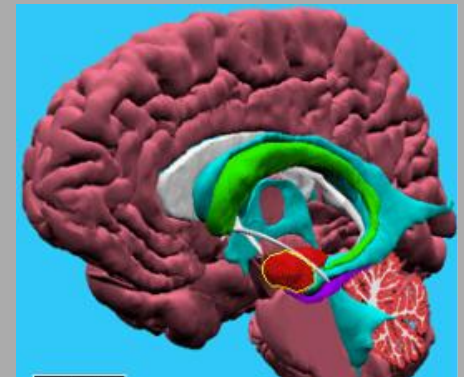
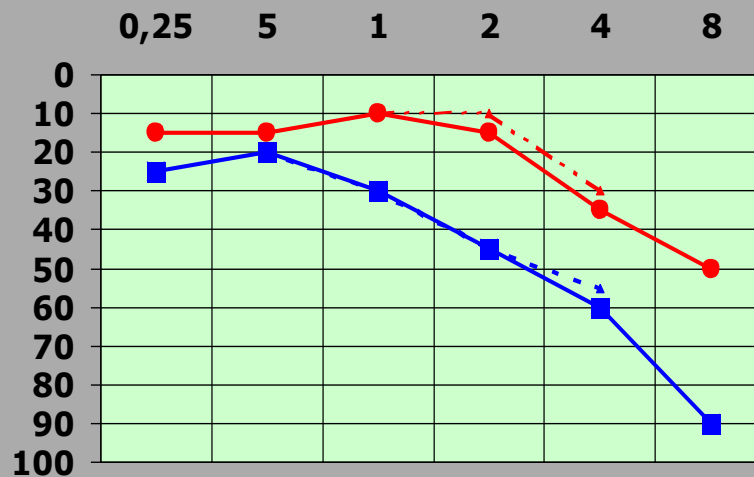
Acufeni e sistema limbico

- *"Ho un tumore in testa ?"*



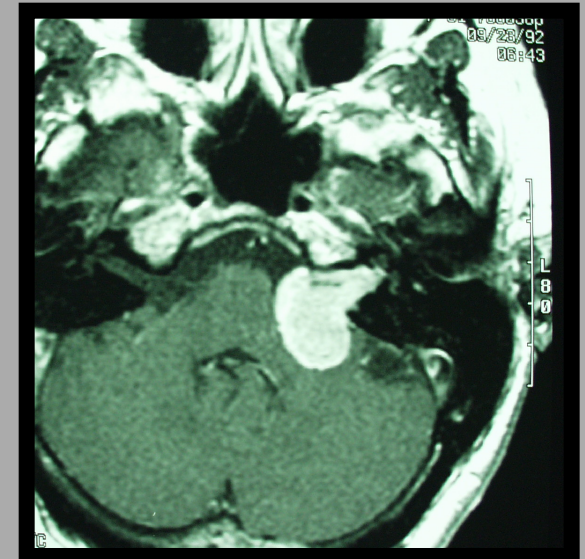
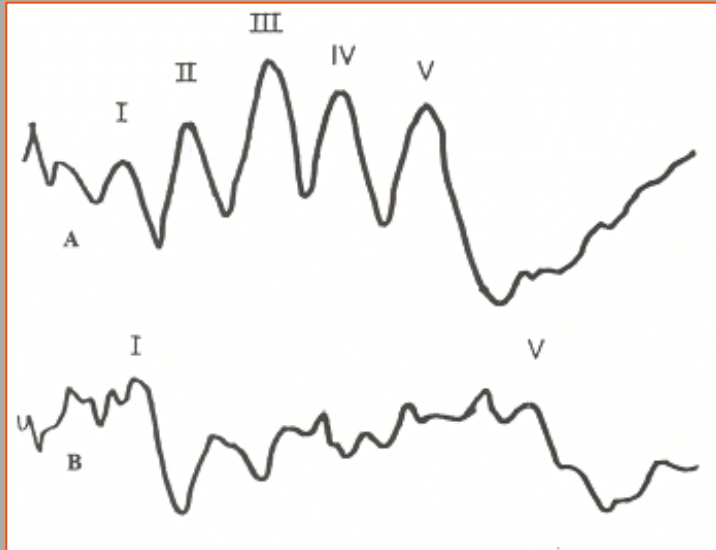
Acufeni e sistema limbico

- *"Ho un tumore in testa ?"*
- Diagnosi differenziale (attenzione agli acufeni monolaterali e alle ipoacusie neurosensoriali asimmetriche)



Acufeni e sistema limbico

- Diagnosi differenziale
 - ✓ Potenziali evocati uditivi (ABR)
 - ✓ RM encefalica con gadolinio



Acufeni e sistema limbico

Tinnitus Retraining Therapy (TRT)

- Rimozione dei fattori emotivi condizionanti che prevengono i fenomeni di adattamento nei confronti dell'acufene mediante
 - ✓ counseling
 - ✓ arricchimento sonoro "ambientale" al fine di ridurre la percezione dell'acufene stesso (ad es. protesi acustica, generatori di rumore)

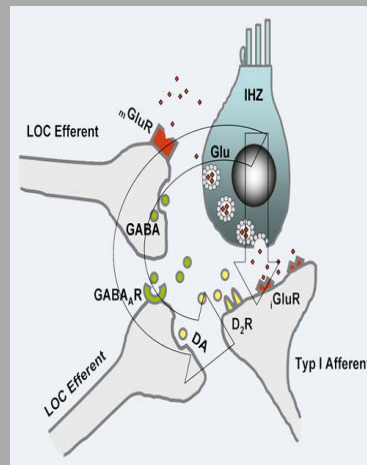


Terapia farmacologica

- Sbilanciamento tra la neurotrasmissione eccitatoria e inibitoria a livello periferico e centrale

L. glutammato

Eccitazione



GABA

Inibizione

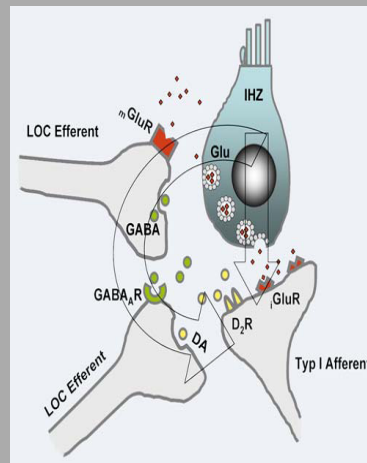
Farmaci GABAergici

- Benzodiazepine
- Baclofene
- Gabapentin
- Acamprosato



L. glutammato

Eccitazione



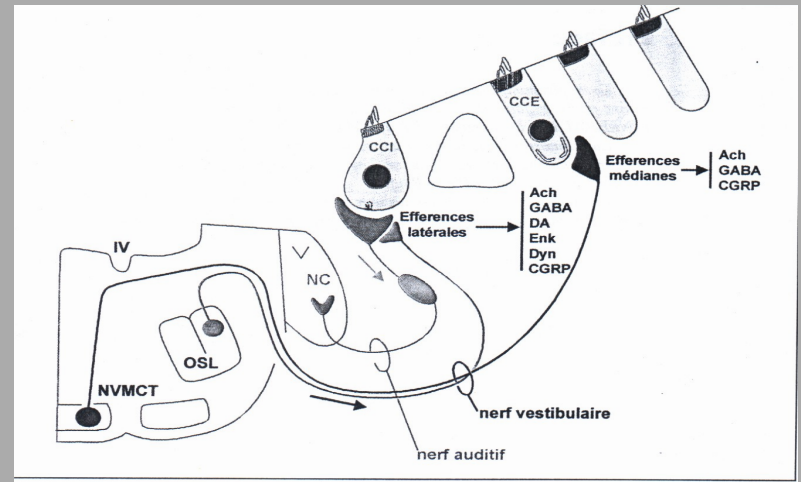
GABA

Inibizione

Vernon JA, Meikle MB. Masking devices and alprazolam treatment for tinnitus. *Otolaryngol Clin North Am.* 2003 Apr; 36:307-20.

Shulman A et al. GABAA-benzodiazepine-chloride receptor-targeted therapy for tinnitus control: preliminary report. *Int Tinnitus J.* 2002;8:30-6.

Review su 3357 pazienti
32% controllo con **clonazepam**
67% controllo con **alprazolam**

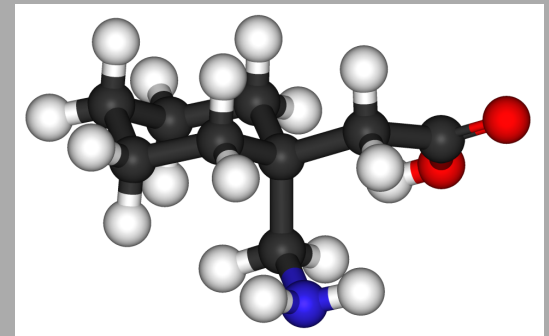


Gabapentin effectiveness on the sensation of subjective idiopathic tinnitus: a pilot study

Eur Arch Otorhinolaryngol (2008) 265:525–530

Mehdi Bakhshaei • Mohammadmehdi Ghasemi • Mahmoodreza Azarpazhooh •

Abstract This prospective, placebo-controlled, double-blind clinical trial evaluated the effectiveness of gabapentin in decreasing subjective features of idiopathic subjective tinnitus in the patients. Pure-tone audiograms, laboratory test and personal histories were used to exclude any particular etiology of tinnitus. Participants were restricted to those with moderate to severe idiopathic subjective tinnitus for at least 6 months. A total of 30 participants received gabapentin in a graduated ascending dose series extending over 4 weeks (peak dose of 900 mg/day). There was not a significant subjective improvement in tinnitus annoyance for the patients (37%) versus controls (42%). Comparison between the results before and after intervention for patients and controls according to subjective response, tinnitus questionnaire, tinnitus severity index and the loudness perception by the patient showed no significant differences ($P > 0.05$). There is insufficient evidence to support the effectiveness of gabapentin in the treatment of tinnitus up to now.



Tinnitus treatment with acamprosate: double-blind study

Rev Bras Otorrinolaringol.

V.71, n.5, 618-23, sep./oct. 2005

Andréia A. Azevedo¹, Ricardo R. Figuetredo¹



Summary

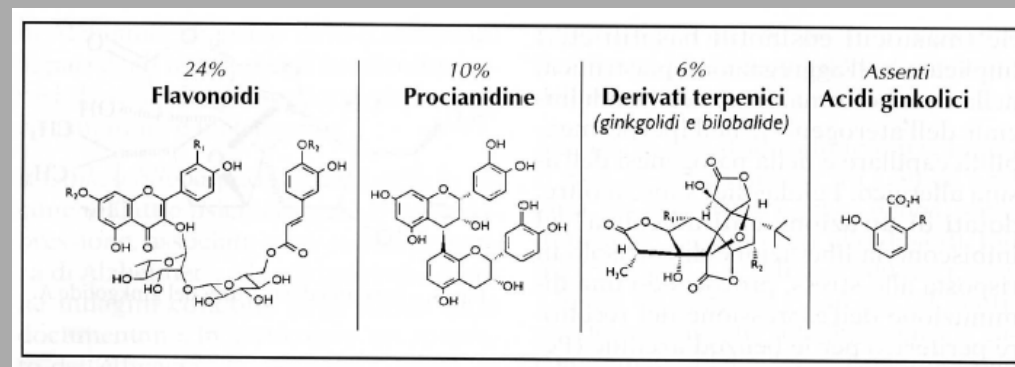
Nowadays, the treatment of tinnitus is still a great challenge for the otolaryngologists. Many facts remain unknown in its pathophysiology, leading to many different therapies, with irregular results. Acamprosate is a drug used in alcoholism treatment, due to its regulating effects in glutamatergic and GABA neurotransmission, and has never been used before in the treatment of tinnitus. **Aim:** To evaluate efficacy and safety of the acamprosate in the treatment of sensorineural tinnitus. **Study design:** randomized clinical trial. **Material and Method:** 50 patients with sensorineural tinnitus were divided into two groups: 25 received acamprosate and 25 placebo, for a period of 3 months, in a prospective double-blind study, being analyzed for its efficacy and safety by the subjective score from 1 to 10 given by the patient. **Results:** We found a high index of success in the relief of tinnitus, about 86.9%. In 47.8% of the cases we found more than 50% relief. The incidence of side effects was low, 12%, all of them mild. **Conclusion:**

Acamprosate, a drug used in the treatment of alcoholism, is a safe and successful alternative for sensorineural tinnitus' treatment.

Ginkgo Biloba



- *Rejali D, et al. Ginkgo biloba does not benefit patients with tinnitus: a randomized placebo-controlled double-blind trial and meta-analysis of randomized trials. Clin Otolaryngol Allied Sci. 2004 Jun; 29(3):226-31.*



ClinicalEvidence

Tinnitus

Search date May 2009

Julian Savage, Stephanie Cook, and Angus Waddell



- We don't know whether [benzodiazepines](#), [acupuncture](#), [hypnosis](#), [electromagnetic stimulation](#), [hearing aids](#), [tinnitus-masking devices](#), [tinnitus retraining therapy](#), [cinnarizine](#), [gingko biloba](#), or [acamprosate](#) are effective in people with tinnitus, because very few studies have been carried out.
- [Carbamazepine](#) may be no more effective than placebo at improving symptoms of tinnitus, and is associated with adverse effects such as dizziness, nausea, and headache.

Trattamento della presbiacusia e dei suoi sintomi

- Il migliore alleato del medico ORL è l'audioprotesista



Trattamento della presbiacusia e dei suoi sintomi

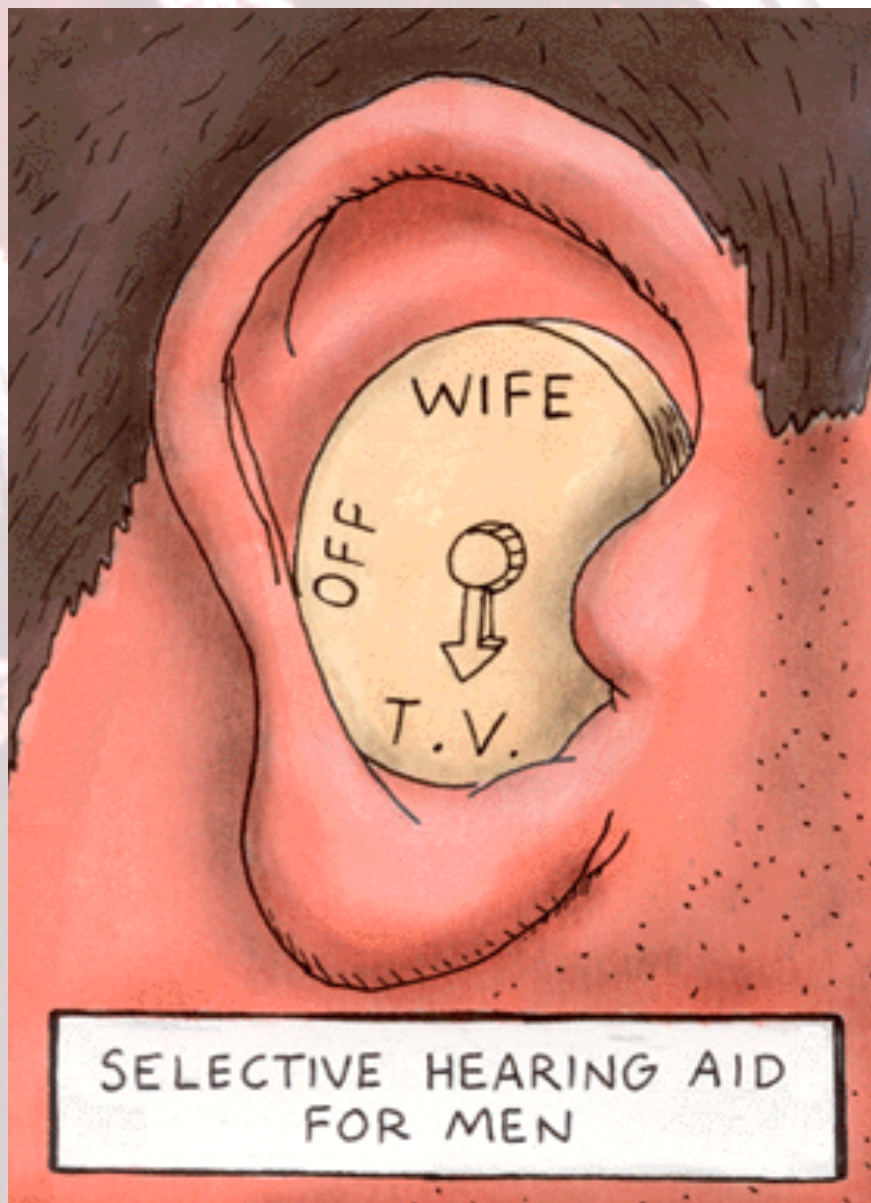


- Il migliore alleato del medico ORL è l'audioprotesista
- L'**arricchimento sonoro** in presenza di ipoacusia è in grado di invertire alcune alterazioni della neuroplasticità indotte dalla privazione uditiva (*Willot et al 2001*)

Trattamento della presbiacusia e dei suoi sintomi



- Il migliore alleato del medico ORL è l'audioprotesista
- L'**arricchimento sonoro** in presenza di ipoacusia è in grado di invertire alcune alterazioni della neuroplasticità indotte dalla privazione uditiva (*Willot et al 2001*)
- Protesizzazione precoce e allenamento acustico



***Grazie per
l'attenzione***