

# Influence of chiropractic cervical manipulation on tinnitus and otoacoustic distortion products in somatosensory tinnitus patients: clinical trial results

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**Introduction** The most shared theory, confirmed by experimental studies in human and animals, interprets the emergence of tinnitus as the consequence of the lack of balance between excitation and inhibition, with the final prevalence of inhibition, in auditory pathways, triggered by a peripheral damage. These changes in neural activity could lead to reorganizations in the nervous system as it try to compensate the deprivation of sensory input, causing hyperactivity symptoms like tinnitus. From a clinical point of view, tinnitus seems to be a very complex symptom, whose pathogenetic mechanism may be not univocal. In fact tinnitus patients, although complain for an audiological symptom, could manifest also vertigo or dizziness, hearing loss, visual symptoms like oscillopsia, sickness and headache are present. All these observations should suggest that maybe the neural mechanism at the basis of tinnitus (plastic changes in auditory pathway) represents the final event of a complex cascade of factors, triggered by the lack of compensation in the interactions among different sensory modalities. A role of the somatosensory system has been recently proposed. In particular, it has been demonstrated that the somatosensory stimulation induces modulation of the activity in the DCN, through spinal trigeminal nucleus and other central structure not directly involved in auditory classical circuit. This activity has been supposed to be at the basis of certain forms of tinnitus.

## Aim of the study

**Starting from the clinical observation of patients with somatic tinnitus, we want to investigate on the contribution of the cranio cervical junction in the modulation of hearing function (assessed by hi def. DPOAEs) and tinnitus. In other words, somatosensory stimulation or manipulation does affect the DPOAEs and/or tinnitus perception?**

## Conclusions

**These preliminary results suggest a causal relationship among the chiropractic treatment of the craniocervical junction, the amplitude of DPs and tinnitus. One possible explanation for the increase in DPOAE amplitude (reflecting outer hair cell motility) could be that the manipulations restored a normal cochlear blood flow (Mom et al, 1999), which could have been impaired by the cervicocranial sub-luxation. Another interpretation of these results is that DPOAEs could have been modulated by the efferent system, through changes in neural inactivity in the cochlear nucleus (Shore et al 2008). **Once more: the patient selection is a critical issue for a successful tinnitus treatment!****

**Methods** Subjects: we recruited a total of 14 (9 males and 5 females) adult patients **with chronic somatosensory tinnitus**.

Procedure: all the subjects underwent an initial audiological evaluation with audiological assessment (pure tonal audiometry, acuphenometry, tympanometry, stapedial reflex threshold, hi def. DPOAE), the administration of THI and VAS scales, the scanning of symptoms, somatosensory manoeuver which modulated tinnitus (Sanchez 2009), X-ray of the cervical spine. Only 11 (8 males and 3 females) patients have completed the protocol at this moment.

All the patients underwent chiropractic treatment, consisting of manual stimulation of the cervical spine, mainly localized at level of the first and second cervical vertebrae (C1-C2). The stimulation is quite strong: a chiropractic maneuver that changes and rebalances the craniocervical junction, that are subluxated in these patients (as X-ray demonstrates). The postural change is also able to modify the tonic activity of the neck muscles. The maneuver is repeated ten times in three months, in order to achieve a stabilization of the new posture.

Administration of THI and VAS Scales, pure tone audiometry and DPOAE were repeated after 3 months by the end of the treatment.

**Results** 8 of the 11 patients that had bilateral tinnitus, 3 of them perceived tinnitus only in the left ear.

Subjective tests as THI and VAS scales show a significative improvement; but also the DP increased in many patients. Group Difference (DP after – before treatment) of DPs for the subjects (all subject pooled together, right and left ear pooled together) are significantly positive (mean +/- SE, 2.4 +/- 0.30, t-test, Diff vs 0, p<0.00001).

	Before	After
THI	58.0 24.2	25.4 20.0
Intensity	4.2 2.2	1.6 1.3
Annoyance	5.2 2.2	1.6 1.8
Life effects	4.8 2.2	1.4 1.5

