**HYPERBARIC OXYGEN THERAPY FOR HEARING LOSS**

[Cochrane Database Syst Rev.](https://www.ncbi.nlm.nih.gov/pubmed/23076907) 2012 Oct 17;10:CD004739. doi: 10.1002/14651858.CD004739.pub4.

# Hyperbaric oxygen for idiopathic sudden sensorineural hearing loss and tinnitus.

[Bennett MH](https://www.ncbi.nlm.nih.gov/pubmed/?term=Bennett%20MH%5BAuthor%5D&cauthor=true&cauthor_uid=23076907)1, [Kertesz T](https://www.ncbi.nlm.nih.gov/pubmed/?term=Kertesz%20T%5BAuthor%5D&cauthor=true&cauthor_uid=23076907), [Perleth M](https://www.ncbi.nlm.nih.gov/pubmed/?term=Perleth%20M%5BAuthor%5D&cauthor=true&cauthor_uid=23076907), [Yeung P](https://www.ncbi.nlm.nih.gov/pubmed/?term=Yeung%20P%5BAuthor%5D&cauthor=true&cauthor_uid=23076907), [Lehm JP](https://www.ncbi.nlm.nih.gov/pubmed/?term=Lehm%20JP%5BAuthor%5D&cauthor=true&cauthor_uid=23076907).

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### Abstract

#### BACKGROUND:

This is an update of a Cochrane Review first published in The Cochrane Library in Issue 1, 2005 and previously updated in 2007 and 2009.Idiopathic sudden sensorineural hearing loss (ISSHL) is common and has a significant effect on quality of life. Hyperbaric oxygen therapy (HBOT) may improve oxygen supply to the inner ear and result in an improvement in hearing.

#### OBJECTIVES:

To assess the benefits and harms of HBOT for treating ISSHL and/or tinnitus.

#### SEARCH METHODS:

We searched the Cochrane Ear, Nose and Throat Disorders Group Trials Register; the Cochrane Central Register of Controlled Trials (CENTRAL); PubMed; EMBASE; Database of Randomised Trials in Hyperbaric Medicine (DORCTHIM); CINAHL; Web of Science; BIOSIS Previews; Cambridge Scientific Abstracts; ICTRP and additional sources for published and unpublished trials. The date of the most recent search was 2 May 2012, following previous searches in 2009, 2007 and 2004.

#### SELECTION CRITERIA:

Randomised studies comparing the effect on ISSHL and tinnitus of HBOT and alternative therapies.

#### DATA COLLECTION AND ANALYSIS:

Three authors evaluated the quality of trials using the 'Risk of bias' tool and extracted data from the included trials.

#### MAIN RESULTS:

Seven trials contributed to this review (392 participants). The studies were small and of generally poor quality. Pooled data from two trials did not show any significant improvement in the chance of a 50% increase in hearing threshold on pure-tone average with HBOT (risk ratio (RR) with HBOT 1.53, 95% confidence interval (CI) 0.85 to 2.78, P = 0.16), but did show a significantly increased chance of a 25% increase in pure-tone average (RR 1.39, 95% CI 1.05 to 1.84, P = 0.02). There was a 22% greater chance of improvement with HBOT, and the number needed to treat (NNT) to achieve one extra good outcome was 5 (95% CI 3 to 20). There was also an absolute improvement in average pure-tone audiometric threshold following HBOT (mean difference (MD) 15.6 dB greater with HBOT, 95% CI 1.5 to 29.8, P = 0.03). The significance of any improvement in tinnitus could not be assessed.There were no significant improvements in hearing or tinnitus reported for chronic presentation (six months) of ISSHL and/or tinnitus.

#### AUTHORS' CONCLUSIONS:

For people with acute ISSHL, the application of HBOT significantly improved hearing, but the clinical significance remains unclear. We could not assess the effect of HBOT on tinnitus by pooled analysis. In view of the modest number of patients, methodological shortcomings and poor reporting, this result should be interpreted cautiously. An appropriately powered trial is justified to define those patients (if any) who can be expected to derive most benefit from HBOT.There is no evidence of a beneficial effect of HBOT on chronic ISSHL or tinnitus and we do not recommend the use of HBOT for this purpose.

[Eur Arch Otorhinolaryngol.](https://www.ncbi.nlm.nih.gov/pubmed/14586625) 2004 Aug;261(7):393-6. Epub 2003 Oct 29.

**Should hyperbaric oxygen be added to treatment in idiopathic sudden sensorineural hearing loss?**

[Topuz E](https://www.ncbi.nlm.nih.gov/pubmed/?term=Topuz%20E%5BAuthor%5D&cauthor=true&cauthor_uid=14586625)1, [Yigit O](https://www.ncbi.nlm.nih.gov/pubmed/?term=Yigit%20O%5BAuthor%5D&cauthor=true&cauthor_uid=14586625), [Cinar U](https://www.ncbi.nlm.nih.gov/pubmed/?term=Cinar%20U%5BAuthor%5D&cauthor=true&cauthor_uid=14586625), [Seven H](https://www.ncbi.nlm.nih.gov/pubmed/?term=Seven%20H%5BAuthor%5D&cauthor=true&cauthor_uid=14586625).

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**Abstract**

At present, there is still no agreement about the therapy of idiopathic sudden sensorineural hearing loss (ISSHL). Hyperbaric oxygen (HBO) is used in the therapy of ISSHL to increase the partial oxygen pressure and the oxygen concentration in the inner ear and also to improve the blood profile and the microcirculation. In our prospective randomized study, we aimed to investigate the therapeutic effects of HBO therapy in the 1st 2 weeks of the onset of ISSHL. Fifty-one hospitalized patients with confirmed ISSHL who had received therapy were grouped randomly into two groups. Twenty-one patients (group I) received steroids, plasma expander dextrans (rheomacrodex), diazepam, pentoxiphylline and salt restriction, and 30 patients (group II) received the same basic treatment with the addition of HBO therapy. Audiological assessments of the patients were performed before and after the treatment. The hearing gains at frequencies of 250, 500, 1,000, 2,000 and 4,000 Hz were calculated separately. The level of hearing loss at the five frequencies was assessed in three groups at the first visit: equal or below 60 dB, between 61-80 dB and equal or above 81 dB. The average of the mean hearing gains at the five frequencies of the patients according to the age groups in group II was compared. The mean hearing gains at the five frequencies were compared between the two groups, and statistically significant improvement was detected in all the frequencies except at 2,000 Hz in group II. The mean hearing gains in group II were found to be significantly high in patients with initial hearing levels up to 60 dB in comparison to patients with initial hearing levels below 60 dB. When age groups and mean hearing gains were compared, there was no statistically significant difference in group I. In group II, the mean hearing gains were 39.1+/-18.3 dB in patients younger than 50 years and 22.7+/-11.3 dB in patients older than 50 years ( P=0.044). In conclusion, the addition of HBO therapy to conventional treatment modalities significantly improves the outcome of ISSHL, especially at the frequencies of 250, 500, 1,000 and 4,000 Hz and in hearing loss of above 61 dB. Furthermore, HBO therapy was found to be more effective in patients younger than 50 years.

[Otol Neurotol.](https://www.ncbi.nlm.nih.gov/pubmed/15547420) 2004 Nov;25(6):916-23.

# Usefulness of high doses of glucocorticoids and hyperbaric oxygen therapy in sudden sensorineural hearing loss treatment.

[Narozny W](https://www.ncbi.nlm.nih.gov/pubmed/?term=Narozny%20W%5BAuthor%5D&cauthor=true&cauthor_uid=15547420)1, [Sicko Z](https://www.ncbi.nlm.nih.gov/pubmed/?term=Sicko%20Z%5BAuthor%5D&cauthor=true&cauthor_uid=15547420), [Przewozny T](https://www.ncbi.nlm.nih.gov/pubmed/?term=Przewozny%20T%5BAuthor%5D&cauthor=true&cauthor_uid=15547420), [Stankiewicz C](https://www.ncbi.nlm.nih.gov/pubmed/?term=Stankiewicz%20C%5BAuthor%5D&cauthor=true&cauthor_uid=15547420), [Kot J](https://www.ncbi.nlm.nih.gov/pubmed/?term=Kot%20J%5BAuthor%5D&cauthor=true&cauthor_uid=15547420), [Kuczkowski J](https://www.ncbi.nlm.nih.gov/pubmed/?term=Kuczkowski%20J%5BAuthor%5D&cauthor=true&cauthor_uid=15547420).

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### Abstract

#### OBJECTIVE:

We investigated the effect of pharmacologic (steroids, vasodilators, vitamins, and Betaserc) and hyperbaric oxygen therapy on patients with sudden sensorineural hearing loss.

#### METHODS:

The pharmacologic arm of the study consisted of 52 patients with defined sudden sensorineural hearing loss treated simultaneously in the ENT Department and National Center for Hyperbaric Medicine of the Medical University of Gdansk, Poland, from 1997 to 2000 (Group A). The hyperbaric oxygen therapy consisted of exposure to 100% oxygen at a pressure of 250 kPa for a total of 60 minutes in a multiplace hyperbaric chamber. The control group included 81 patients with defined sudden sensorineural hearing loss treated in the ENT Department, Medical University of Gdansk, from 1980 to 1996 (Group B). Both groups were comparable regarding the age of the patients, season of hearing loss occurrence, tinnitus and vestibular symptom frequency, delay before therapy, and average threshold loss before the start of treatment. The treatment results (hearing gain) were estimated using pure-tone audiometry. We retrospectively analyzed the audiograms of all patients.

#### RESULTS:

Patients from Group A (blood flow-promoting drugs, glucocorticoids in high doses, betahistine, and hyperbaric oxygen therapy) showed significantly better recovery of hearing levels compared with those from Group B (blood flow-promoting drugs and glucocorticoids in low doses) at seven frequencies (500, 1,000, 2,000, 3,000, 4,000, 6,000, and 8,000 Hz) (p < 0.05) and four groups of frequencies (pure-tone average, high-tone average, pure middle-tone average, and overall average) (p < 0.05). Percentage hearing gain in all investigated frequencies was also better in Group A versus Group B, and the differences were statistically significant (p < 0.05).

#### CONCLUSION:

We conclude that hyperbaric oxygen therapy with high doses of glucocorticoids improves the results of conventional sudden sensorineural hearing loss treatment and should be recommended. In addition, the best results are achieved if the treatment is started as early as possible.

[Adv Otorhinolaryngol.](https://www.ncbi.nlm.nih.gov/pubmed/?term=Lamm+K%2C+Lamm+H%2C+Arnold+W.+Effect+of+hyperbaric+oxygen+therapy+in" \o "Advances in oto-rhino-laryngology.) 1998;54:86-99.

**Effect of hyperbaric oxygen therapy in comparison to conventional or placebo therapy or no treatment in idiopathic sudden hearing loss, acoustic trauma, noise-induced hearing loss and tinnitus. A literature survey.**

[Lamm K](https://www.ncbi.nlm.nih.gov/pubmed/?term=Lamm%20K%5BAuthor%5D&cauthor=true&cauthor_uid=9547879)1, [Lamm H](https://www.ncbi.nlm.nih.gov/pubmed/?term=Lamm%20H%5BAuthor%5D&cauthor=true&cauthor_uid=9547879), [Arnold W](https://www.ncbi.nlm.nih.gov/pubmed/?term=Arnold%20W%5BAuthor%5D&cauthor=true&cauthor_uid=9547879).

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**Abstract**

With the published clinical data to hand on the therapeutic results of patients with idiopathic sudden hearing loss, acoustic trauma or noise-induced hearing loss, it may be confirmed that 65% of those polypragmatically treated patients demonstrated a hearing improvement of 19 +/- 4 dB. In 35% of the cases, no hearing improvement was detected independent of the drugs administered. This corresponds to the results obtained from placebo-treated patients who demonstrated a hearing improvement of 20 +/- 2 dB in 61% of cases and no hearing gain in 39% of cases (fig. 1). A different set of results was obtained from patients with a hearing loss who were treated either with prednisolone or placebo. The percentage of patients who achieved normal hearing again in the placebo-treated group amounted to 31% and 38% and in the verum-treated group 50% and 78%. It may be concluded that a placebo therapy is equally effective to that of all nonsteroidal drugs. Problems arise when comparing non-treated patients since information on spontaneous remission rates differs greatly in the references, i.e. between 25-68% for spontaneous full remissions and 47-89% for spontaneous partial remissions. From a statistical view, 35% and 39% of patients experienced no success with nonsteroidal drugs or placebo, respectively. These patients can still be helped with HBO therapy. 18 patients only underwent primary HBO therapy. In all other 50 studies evaluated here with a total of 4, 109 patients suffering from idiopathic sudden hearing loss, acoustic trauma or noise-induced hearing loss and/or tinnitus, HBO therapy was administered as a secondary therapy, i.e. following unsuccessful conventional therapy. If the onset of affliction was more than 2 weeks but no longer than 6 weeks, one half of the cases showed a marked hearing gain (in at least 3 frequencies of more than 20 dB), one-third showed a moderate improvement (10-20 dB) and 13% showed no hearing improvement at all (fig. 2). 4% no longer experienced tinnitus, 81.3% observed an intensity decrease and 1.2% an intensity increase of their tinnitus condition. 13.5% remained unchanged (fig. 2). If HBO therapy was administered at a later stage, but still within 3 months following onset of affliction, 13% showed a definite improvement in hearing, 25% a moderate improvement and 62% no improvement at all. 7% no longer suffered from tinnitus, 44% reported an intensity decrease, a similar percentage noticed no change and 5% a temporary deterioration of their tinnitus condition. If the onset of affliction was longer than 3 months up to several years, no hearing improvement can be expected in the majority of patients (fig. 3); however, one third of the cases reported an intensity decrease of tinnitus, 60-62% reported no change and 4-7% noticed a temporary intensity increase (fig. 4). In conclusion, it may be deduced that HBO therapy is recommended and warranted in those patients with idiopathic sudden deafness, acoustic trauma or noise-induced hearing loss within 3 months after onset of disorder.