Systematic review of intratympanic gentamicin in Meniere's disease
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CRD summary
The review concluded that intratympanic gentamicin appears effective for the control of symptoms of Meniere's disease, regardless of method of delivery, dosing frequency or concentration. There is a likelihood of significant bias in the published studies. Methodological weaknesses in the review, together with the authors' appropriate consideration of the limitations of the included studies, suggest that the findings may not be reliable.

Authors' objectives
To evaluate the use of intratympanic gentamicin for the treatment of Meniere's disease with regard to symptoms of vertigo, tinnitus and change in hearing.

Searching
MEDLINE (1966 to February 2003), EMBASE (1988 to February 2003) and the Cochrane CENTRAL Register (Issue 4, 2002) were searched; the search terms were not reported. Only articles published in English were eligible for inclusion.

Study selection
Studies assessing participants with Meniere's disease who were undergoing treatment with intratympanic installations of gentamicin were eligible for inclusion. Studies had to report one or more of vertigo control, hearing change and tinnitus control, and the reported outcomes had to conform to recognised guidelines. Inclusion criteria were not specified in terms of the study design, though eligible studies had to compare pre-treatment with post-treatment symptom control. Individual case reports were excluded from the review.

Most of the participants in the included studies had unilateral Meniere’s disease, but some participants had bilateral Meniere's disease and some had also undergone prior surgery. The participants were aged from 12 to 94 years. The included studies included concentrations of gentamicin, ranging from 10 to 80 mg/mL, injected into the middle ear; delivery techniques included direct needle injection through timpanic membrane, injection through a tympanostomy tube, continuous infusion using microcatheter with pump and eustachian tube catheter. Dosing frequency included multiple daily doses, a single daily dose and weekly dosing. Follow-up ranged from 3 to 48 months.

Two reviewers independently selected studies for inclusion and resolved any disagreements through recourse to a third author.

Assessment of study quality
The authors did not state that they assessed validity.

Data extraction
It appears that two reviewers independently extracted the data and resolved any disagreements through recourse to a third author. Vertigo and hearing changes were classified using the American Academy of Otolaryngology-Head and Neck Surgery Committee on Hearing and Equilibrium guidelines. Changes in tinnitus were based on subjective report of improvement after treatment.

Methods of synthesis
Results from the studies were pooled and summary statistics were calculated for vertigo control results, hearing loss and tinnitus. In addition, the results were stratified by method of delivery, concentration of gentamicin, frequency of dosing and length of follow-up. The results were tabulated and discussed in the text. Some differences between the studies were mentioned in the text, but no formal assessment of heterogeneity was carried out.

Results of the review
Thirty-five studies (n=1,273) were included. Study designs were not reported, but no study used an adequate control group for comparison.

Overall pooled results on vertigo control (34 studies, n=1,262) reported complete or substantial control for 89% of participants (range: 73 to 100%) and worse hearing (30 studies, n=1,036) for 26% of participants (range: 0 to 90%), and 57% of participants (range: 0 to 82%) reported subjective improvement in tinnitus (13 studies, n=535).

An assessment of the different methods of delivery, dosing frequency and concentration of treatment showed similar rates for vertigo control and hearing loss (details reported in the review).

Sixteen studies (n=1,045) reported a minimum of 2 years' follow-up and found vertigo improved in 87% (475 out of 547) of participants (range: 76 to 100%) and hearing loss in 24% (120 out of 498) of participants (range: 0 to 75%).

**Authors' conclusions**
Intratympanic gentamicin appears effective for the control of symptoms of Meniere's disease, regardless of method of delivery, dosing frequency or concentration. There is a likelihood of significant bias in the published studies.

**CRD commentary**
The review question was clear in terms of the participants, intervention and outcomes, but was not defined in terms of the study design. Several relevant sources were searched, but no search terms were reported. The search strategy was not reported and can neither be evaluated nor replicated. The restriction to English language studies might have resulted in the loss of some relevant data. No attempts were made to locate unpublished data. The authors indicated the likelihood of publication bias, although this was not formally assessed. Methods were used to minimise reviewer error and bias in the study selection and data extraction processes. Study validity was not assessed, so the results from these studies and any synthesis might not be reliable. The narrative synthesis was appropriate given the heterogeneity of the participants and included studies. Methodological weaknesses in the review, together with the authors' appropriate consideration of the limitations of the included studies, suggest that the findings may not be reliable.

**Implications of the review for practice and research**
Practice: The authors stated that the most convenient treatment regimen should be employed, but variations are likely to exist between patients.

Research: The authors stated that further prospective randomised blinded placebo-controlled trials are necessary to evaluate the effectiveness of intratympanic gentamicin.

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.