Otitis media and hearing loss among 12-16-year-old Inuit of Inukjuak, Quebec, Canada

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ABSTRACT
Objectives. Chronic otitis media (COM) and associated hearing loss is a frequent problem for many Inuit children in Canada. In this study, we evaluated individuals aged 12-16 years living in Inukjuak, to determine the prevalence of middle ear disease and hearing loss, and the effect of hearing loss on academic performance.

Methods. Otological examination, hearing test, medical and school file review were performed in November 1997. 88 individuals were seen.

Results. Otological examination revealed maximal scarring in 1.8%, minimal scarring in 34.9%, normal eardrums in 49.1% and chronic otitis media in 16.9%. There were 62 individuals whose ear exams could be directly compared with a previous exam done in 1987. Of those, there were three ears that had developed COM and 4/13 ears with COM in 1987 that had healed. Hearing tests found bilateral normal hearing in 80% (PTA <20dB), unilateral loss in 15% and bilateral loss in 5%. Hearing loss was associated with poorer academic performance in Language (p<.05). A similar trend was found in Mathematics but not in Inuttitut.

Conclusion. Chronic otitis media remains a significant problem among the Inuit, with a prevalence of 16.9% in individuals aged 12-16 years. One in five in this age group has hearing loss, and this hearing loss impacts on academic performance.

Key words: otitis media, Inuit, hearing loss

INTRODUCTION
Chronic otitis media (COM) and associated hearing loss is a frequent problem for many Inuit children in Canada (1). A study in Kuujjuaarpik, Nunavik, Quebec (2) found that 23% of school age Inuit children had a significant hearing loss in one or both ears. Comparatively, in the USA, 1.6-2.1% of children under 18 years have hearing loss (3). Hearing loss due to otitis media can cause delayed language and speech development, and in students it can lead to difficulties in learning and poorer academic achievement (4).

Otitis media in pre-school children was the object of a study in Inukjuak, Nunavik, Quebec in 1987 (5). It was found that 23.9% of eardrums were normal, 45.6% of eardrums had minimal scarring, 17.9% of eardrums had maximal scarring, 9.4% had COM and 3.3% had serous otitis media. Although COM is often established before the age of two years among the Inuit, a follow-up study of children in the Baffin region found that 41% of eardrum perforations had spontaneously closed eight years later (1).

In the present study, we returned to Inukjuak to evaluate the children who were aged 12-16 in 1997. The objectives were to assess the current prevalence of middle ear disease, to compare these data with the data collected in 1987, to determine the prevalence of hearing loss and assess the impact of hearing loss on academic performance.

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MATERIALS AND METHODS
The data were collected in October and November, 1997. All residents of Inukjuak, born between January 1981 and December 1984, (113 persons) were invited to participate. A total of 88 youths were seen. Excluding those absent from the village, the participation rate was 88%. An otological examination was performed by one of three ENT consultants using the same evaluation form as used in 1987. Of the 110 children who were seen in 1987, there were 62 children for whom the data from 1987 could be retrieved from the medical file for direct comparison.

Hearing was tested by an audiologist or a trained Inuit technician using a portable audiometer in a quiet room. Testing was done within six weeks of the otological examination. Pure tone averages (PTA) were calculated (average of .5k, 1k, 2kHz).

Grades in Inuttitut, Language (English or French) and Mathematics in the last completed school year were collected from the school files. For the analysis of association between hearing loss and academic achievement, two groups were formed with normal hearing defined as a PTA < 20 dB bilaterally.

The data capture was by the Epi-Info software (version 5.01 US, December 1990, CDC). The statistical treatment of the data was realised by the SAS software package (SAS Institute 1988).

RESULTS
Comparisons of ear examinations in 1987 and in 1997 are presented in Figure 1. Compared with 1987, the number of normal eardrums increased 25% (23.9% to 49.1%) in 1997. There were fewer abnormal ear examinations, fewer eardrums with maximal scarring (17.8% to 1.8%), minimal scarring (45.6% to 34.9%), and fewer ears with serous otitis media (3.1% to 0%). However, at the same time, the prevalence of chronic otitis media increased from 9.4% to 16.9%.

For the 62 children whose ear condition in 1997 could be directly compared with that in 1987, we found that thirty-one percent (4 out of 13) of the
ears that had had COM in 1987 had healed. Three eardrums that had had minimal or maximal scarring in 1987 had developed COM in 1997.

The results of hearing tests found bilateral normal hearing in 80% (PTA <20dB). There was unilateral loss in 15% (n=13) and bilateral loss in 5% (n=4). Six percent of the sample (five boys) were found to have sensorineural hearing loss (HL>20dB at 2k or 4kHz), probably associated with noise exposure.

Hearing loss was found to be significantly associated with poorer academic performance in Language (p<.05). A similar trend was found in Mathematics but not in Inuttitut, see Figure 2.

DISCUSSION
The results of this study indicate that there has been some improvement in ear conditions over the ten-year period, with more normal eardrums, fewer eardrums with minimal and maximal scarring, and less serous otitis media observed than previously, the prevalence of COM increased to 16.9%. As COM often causes hearing loss, the impact on this school age group is significant. In fact one in five students, 20% of the group, were found to have hearing loss. This hearing loss was found to have a negative impact on school performance. Students with hearing loss were found to perform significantly more poorly in second language than those with normal hearing. A similar trend was found for Mathematics but not Inuttitut.

While caution must be used in interpreting the results of the 62 children in whom ear evaluations could be directly compared, our findings were similar to those found in Baffin (1). Most of the ears (69%) that had COM in 1987 still had COM in 1997. However, there were some eardrums that had healed spontaneously, a factor to be considered when recommending tympanoplasty surgery. There were also other individuals who developed COM since the previous evaluation at age 2-6 years. This finding suggests that a one-time screening may miss cases that develop later.

All these findings indicate the need for our continued efforts in the prevention and treatment of otitis media and the rehabilitation of hearing problems in Inuit children.

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