

# Cystic Fibrosis Research News

## Title:

**The Cumulative Effects of Intravenous Antibiotic Treatments on Hearing in Patients with Cystic Fibrosis**

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## What was your research question?

We investigated whether cystic fibrosis (CF) patients with greater lifetime exposure to intravenously (IV) administered aminoglycoside antibiotics (e.g., tobramycin) had a higher risk of hearing loss compared to those patients with less exposure over their lifetime.

## Why is this important?

This data supports assertions that certain types of IV-antibiotics are related to hearing loss and thus alternative therapies should be discussed between patient and physician when alternatives are available. Patients with CF are living longer, increasing the importance of maintaining their quality of life over a longer period of time. Hearing loss negatively impacts one's work, academic and social activities leading to reduced quality of life and isolation. Our team is dedicated to preventing drug-induced hearing loss in CF patients.

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## What did you do?

We examined the medical records of 81 CF patients, ages 15-63 years, treated at Oregon Health & Science University. All subjects received a standard hearing test, and were categorized into one of four groups based on their lifetime dosage of IV aminoglycoside antibiotics. Two different analytical strategies were used for categorizing dosing groups. The first strategy counted the total individual doses a patient received over their lifetime. The second strategy also incorporated the number of doses given per day. Patients in each of these lifetime dose antibiotic groups were analysed with respect to their hearing test results.

## What did you find?

We found that the two higher dosing groups were 4.79 times more likely to experience permanent hearing loss than the two groups with lower cumulative antibiotic dosing. This result was replicated when we accounted for the number of doses per day. Our findings also indicated that patients with greater drug exposure, tended to be older than those with less drug exposure, however, the risk of hearing loss was independent of age-related effects. Interestingly, there was a small group of patients in the highest dosing group who had exceptionally good hearing. This suggests that some patients may be 'resilient' to the ototoxic effects of IV aminoglycosides, and that other factors, such as genetic predisposition, may play a role in the increased risk of hearing loss.

## What does this mean and reasons for caution?

While IV aminoglycoside is a predictor of hearing loss, there may be other related factors that weren't addressed in this study, which may increase a patient's risk for developing ototoxic hearing loss. Furthermore, it is important for the patient and physician to discuss the potential risks of hearing loss; however the need for effective life-saving treatment may outweigh the risk of ototoxicity.

## What's next?

We are now investigating other factors (e.g., co-administration of other drugs, inflammation, genetic factors) that can contribute to increased risk of hearing loss in CF patients receiving antibiotics that may affect their hearing. We'd also like to understand why some patients with high dosing have normal hearing.



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