

Vitamin supplements may prevent drug-induced hearing loss

March 14 2014, by Jill Pease

(Medical Xpress)—The drug gentamicin can provide effective treatment for people with bacterial infections that are resistant to other antibiotics, but this medication can cause a serious side effect, too: hearing loss.

Now, University of Florida researchers have discovered that a dietary supplement shows promise for protecting against drug-induced [hearing loss](#) when taken during gentamicin treatment. The findings of this study in rodents appear online ahead of print in the *Journal of the Association for Research in Otolaryngology*.

Gentamicin belongs to a class of antibiotics called aminoglycosides. They are used to treat infections that are resistant to other antibiotics, including penicillin or amoxicillin. Aminoglycosides are prescribed in the U.S. for conditions such as multidrug-resistant tuberculosis or for frequent lung infections experienced by patients with cystic fibrosis.

"In developing countries aminoglycosides are often used as a first-line treatment for any infection because they are so cheap and so readily available," said Colleen Le Prell, the study's lead investigator and an associate professor in the UF College of Public Health and Health Professions' department of speech, language and hearing sciences.

Other studies have shown that between 2 and 25 percent of patients taking aminoglycoside antibiotics experience hearing loss. Estimates vary because hearing loss may develop slowly over weeks, and hearing tests taken during or immediately after drug treatment may miss hearing

loss, Le Prell said. In addition, some studies use hearing tests that are more sensitive to the earliest effects of damage to the cells in the inner ear.

Le Prell and colleagues tested the use of a dietary supplement containing the antioxidants beta carotene and vitamins C and E, as well as the mineral magnesium, for protection against gentamicin-induced hearing loss. Hearing loss is largely caused by the production of [free radicals](#), which destroy healthy inner ear cells. The antioxidant vitamins prevent hearing damage by "scavenging" the free radicals and protecting against their effects.

In previous studies, Le Prell demonstrated that these supplements prevented noise-induced hearing loss in animals. She is currently testing the vitamin combination in human clinical trials.

"We're enthusiastic about the use of these vitamins because of the significant safety profile that exists," Le Prell said. "These agents are generally regarded as safe with very well-known recommended daily intakes."

In the current study, researchers at UF and the University of Michigan gave guinea pigs a two-week course of gentamicin. Before and during administration of the antibiotic, half the animals ate traditional chow and the other half received food enriched with the vitamin supplements. Scientists tested the guinea pigs' hearing before and up to nine weeks after antibiotic treatment by measuring the animals' brain stem activity in response to brief sound bursts.

The researchers found that animals that received the [dietary supplement](#) had better maintenance of hearing than animals that ate the standard diet.

"The best protection was obtained at lower test frequencies and that's important because the lower frequencies are essential for speech," Le Prell said.

Researchers also examined the inner and outer hair cells in the animals' ears. In humans, death of [outer hair cells](#) results in a loss of about 40 decibels of hearing, so these cells are critical for normal hearing, Le Prell said. While some of the animals in the control group experienced complete outer hair cell death after receiving gentamicin, those animals that had the vitamin-enriched diet fared much better.

Future research should examine whether combining aminoglycosides with the vitamin mix can cause a drug interaction that may affect the antibiotics' efficacy. A preliminary study conducted at UF showed that gentamicin's effectiveness wasn't lowered by the vitamins, but more research is needed before moving to clinical trials, Le Prell said.

"The long-term vision is clearly to see whether you can get the same benefit in human patients who are being treated with these aminoglycosides," she said.

Provided by University of Florida

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