

Can nutritional supplements impact genetic hearing loss in children?

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An enhanced diet helped reduce hearing loss in mice with the genetic mutation most commonly responsible for childhood deafness, new research suggests.

The study found that an antioxidant regimen of beta carotene (precursor to vitamin A), vitamins C and E and magnesium helped slow progression of hereditary deafness in the mice with a connexin 26 gene deletion. Mutations in this gene are a leading cause of genetic hearing loss in many populations.

Meanwhile, the enhanced diet had the opposite effect on another mutant mouse modeling AUNA1, a rare type of hearing loss, according to the research from University of Michigan's Kresge Hearing Research Institute and U-M's C.S. Mott Children's Hospital.

The findings appear in *Scientific Reports* from the publishers of Nature.

"Many babies born with a genetic mutation that causes deafness pass their newborn screening test but then lose their hearing later in life," says author Glenn Green, M.D., associate professor of

pediatric otolaryngology at C.S. Mott Children's Hospital.

"These patterns suggest that for some children, there may be an opportunity to potentially save cells present at birth. For these childhood cases it's crucial that we identify therapies that prevent progression and reverse loss of hearing.

"Our findings suggest that a particular high dose of mineral and vitamin supplements may be beneficial to one genetic mutation," adds senior author Yehoash Raphael, Ph.D., professor in the Department of Otolaryngology-Head and Neck Surgery at the University of Michigan Medical School.

"However, the negative outcome in the AUNA1 mouse model suggests that different mutations may respond to the special diet in different ways."

Mice in the study received the antioxidant regimen postnatally and in utero in separate experiments. In the connexin 26 mouse model, the enhanced diet was associated with a slower progression of hearing loss and small but significant improvement in hearing thresholds. However, mice with the AUNA1 gene mutation experienced the opposite outcome, showing accelerated progression of deafness following the diet.

In the inner ear, reducing oxidative stress related to overstimulation has been shown to protect sensory hair cells and hearing, notes author and U-M professor emeritus Josef Miller, Ph.D., who developed the micronutrient formulation.

Antioxidants have been shown to reduce the impact of oxidative stress in neuronal disorders, cancer, heart diseases and inflammatory diseases, Miller says. Antioxidant treatment has also been shown to preserve gap junctions, which are the cellular components directly impacted by loss of connexin 26.

"These findings are encouraging for those of us who treat children with progressive connexin 26 [hearing loss](#), and possibly for other mutations not yet tested," says Green. "Further studies are needed to confirm these findings in children and to explore whether oral administration of antioxidants could someday be considered as an effective treatment."

The recent research follows a case study University of Michigan published last year in which the same nutritional supplements were associated with slowing the progression of deafness for a boy with a connexin 26 mutation.

More information: "ACEMg Diet Supplement Modifies Progression of Hereditary Deafness, *Sci. Rep.* 6, 22690; [DOI: 10.1038/srep22690](https://doi.org/10.1038/srep22690) (2016).

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