Presenting Author Name
Gandhrav Goel (1)

Presenting Author Category
Masters Student

Research Category
Basic Science

Abstract Title
Functional and spatial analysis of the effects of neomycin on neuromast cells looking at their regeneration and development within Mexican tetra (Astyanax mexicanus).

Background
Neomycin is a broad-spectrum aminoglycoside antibiotic, limited in clinical use due to its toxic effects on the human body. Aminoglycosides, disrupt protein synthesis by interfering with translation, leading to cell dysfunction and death. Prolonged neomycin exposure can cause permanent damage, most notably leading to loss of sensory hair cells within the auditory and vestibular systems. Particularly concerning within pediatric medicine, where such drugs prescribed to children can induce neurosensory hearing loss, having impacts on language development, learning, and quality of life.

Objective
To investigate this ototoxic effect, Astyanax mexicanus (Mexican tetra), were exposed to neomycin and analyzed for neuromast cell regeneration and development. Neuromast hair cells are analogous to mammalian inner ear hair cells found with lateral lines of teleost fish.

Methods
Juvenile surface-dwelling Mexican tetra were treated with 500 µM neomycin for 4 hours, and neuromast survival and regeneration were assessed at 4-, 12-, 24-, and 72-hours post-treatment. Hair cell loss was visualized using 2-(4-(Dimethylamino)styryl)-N-ethylpyridinium iodide (DASPEI), a live mitochondrial stain specific to sensory hair cells.

Results
Results showed acute neuromast loss following neomycin exposure, with regeneration to baseline levels observed at 72- hours post treatment. Gene expression analysis by qPCR revealed increased expression of Axin2 and Fgf1 during regeneration, particularly at 72 hours compared to both untreated controls and 24-hour post-treatment samples.

Conclusion
Demonstrating the regenerative capacity for neomycin-induced hair cell damage of Juvenile Mexican tetra surface fish and highlighting its potential as a novel model organism for ototoxicity and auditory regeneration studies. Importantly, understanding the molecular mechanisms of hair cell regeneration in this model may contribute to the development of therapeutic approaches aimed at preventing or reversing antibiotic-associated hearing loss in children.

Authors

Name	Role	Profession
Gandhrav Goel	Presenting Author	Graduate
Nitesh Sanghai	Co Author	Graduate
Geoffrey Tranmer	Co Author	Full Professor
Devi Atukorallaya	Co Author	Associate Professor