Several effective therapeutics can result in significant and irreversible hearing loss due to the death of inner ear hair cells. To combat drug-induced ototoxicity, the Simon Lab has designed compounds that protect and provide treatment against drug-induced hearing loss. Through incorporating chemically reactive functionality, the lab showed that pretreatment with the irreversible binder can provide long-term protection against sensory hair cell death. This irreversible binder can protect against hearing loss, even after treatment has stopped, unlike other compounds currently in development that use a reversible mechanism of action.

Applications
- Protection against drug-induced hearing loss (aminoglycoside antibiotic, platinum chemotherapeutic, loop diuretics, or other ototoxic therapeutics)

Advantages
- Longer-lasting effects than reversible binders
- Covalent bonding with biological binding sites
- Can be administered before or after use of an ototoxic treatment or in combination with other therapeutics, including ototoxic drugs

Market Overview
Nearly a fifth of Americans 12 years or older (48 million) suffer from hearing loss in at least one ear with an estimated 30 million having bilateral hearing loss. Currently, there are more than 200 known ototoxic medications on the market, including some antibiotics, aminoglycosides, chemotherapeutic agents, antimalarial drugs, and interferon polypeptides, and no therapeutics to protect against hearing loss. Up to 50% of patients being treated with cisplatin experience hearing loss and up to 10% of patients on aminoglycosides experience ototoxicity.