

## Synthesis of Cell Penetrating Peptide Conjugated Nanoparticles for Hearing Loss Therapy

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Hair cells are located in the cochlear of the inner ear. Once hair cells are damaged, they cannot grow and cause permanent hearing loss. The therapies for hearing loss with traditional strategies were concentrated on the drug delivery to the hair cell. However, these were often unsuccessful, because only small quantities of drug could access to the hair cells through round window membrane (RWM). In this study, we developed a drug delivery system for hearing loss. We synthesized nanoparticles which can access a hair cell through a round window membrane (RWM). These nanoparticles are polymer micelles, hydrophobic alpha-lipoic acid (LA) conjugated with hydrophilic Poly (2-hydroxyethyl aspartamide (PHEA) and cell penetrating peptide (CPP).

We applied the cell penetrating peptide to the nanoparticle to penetrate RWM and a hair cell membrane. Cell penetrating peptide aids cell membrane penetration of a nanoparticle. We used arginine oligomer (Arg8), which is a type of cell penetrating peptides. Also, hydrophobic drugs are located inside the shell, and the gene is decorated on the outside.