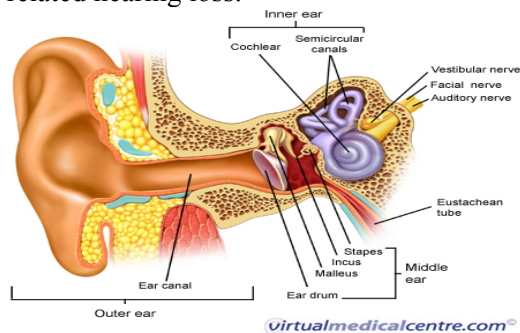


## Stem Cell Research on Hearing Loss

By, Michael Lovrity

### How is Hearing Loss Caused

- There are three kinds of hearing loss: Conductive, sensorineural (nerve deafness) and mixed (both conductive and SNHL).
- Conductive hearing loss is due to problems with the ear canal, ear drum, or middle ear and its little bones (the malleus, incus, and stapes).
- Sensorineural hearing loss is due to problems of the inner ear, also known as nerve-related hearing loss.



### Current Treatments for Hearing Loss

- Cochlear Implants
- Hearing Aids
- For people whose hearing loss is caused by damage to the hair cells, treatments like hearing aids and cochlear implants can lead to substantial improvements in hearing and quality of life.
- Regardless of what triggers deafness, all forms of irreversible hearing loss involve damage to two main cell types within the ear: The hair cells that amplify incoming sounds and convert them to electrical stimuli, and the neurons that carry those electrical stimuli to the brain.

### The Study on Stem Cells Method for Hearing Loss

- A team treated stem cells with two types of fibroblast growth factor, FGF3 and FGF10. This produced two types of primordial sensory cell: otic epithelial progenitors (OEPs) which are like hair cells, and otic neural progenitors (ONPs) which are like neurons. They then transplanted only the ONPs into the ears of gerbils treated with ouabain, a chemical that damages auditory nerves, but not hair cells.
- The researchers used a method called ABR (auditory brainstem evoked responses) to measure how well the brain detects an electrical signal after sound stimulation.

### The Results of the Study

- **Ten weeks later, some of the transplanted cells had grown projections that connected to the brain stem.**
- **Four weeks after transplantation, the average overall improvement in hearing (functional recovery) was 46%.**

### Future of Stem Cell Therapy

- The first clinical trials involving embryonic stem cell research on humans began at Geron, a biotech company. Although, the trials were stopped for financial reasons, some of the patients who received stem cell transplants have begun to exhibit positive outcomes.

□ Thus, in the future, our goal is to to form new organs and repair organs, through the method of stem cell therapy.

