Method for Replacing Hair Cells and Spiral Ganglia Neurons to Restore Hearing Loss

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ABSTRACT

Neural stem cells as therapeutic agents for the treatment of hearing loss

FULL DESCRIPTION

Ten percent of the world's population suffers from hearing loss due to damaged hair cells of the inner ear. Hair cells supply signals that promote the survival of spiral ganglia neurons (SGNs), the next link in the sonic signaling chain. Once the hair cells die, so do the SGNs. Hair cells regenerate at an extremely low rate. Thus, a cell replacement stratagem may offer a more immediate therapy due to the permanent loss of hair cells and SGNs.

Researchers at the University of California, Davis have discovered the existence of a source of replacement cells for both hair cells and SGNs in the lateral wall of the lateral ventricle that can serve as biological implants for the deaf and hard of hearing.

APPLICATIONS

- Treatment for hearing loss

FEATURES/BENEFITS

Most forms of sensorineural hearing loss result from irreversible damage of cochlear hair cells which is followed by degeneration of target-deprived spiral ganglia neurons (SGNs). Secondary degeneration of SGNs could severely compromise the efforts to rehabilitate hearing impaired patients with cochlear implants or hair cell regeneration. However, there is limited availability of newly generated SGNs in humans and biological implantation of cells is not therapeutically inefficacious.

- Discovered both neural stem cells and epithelial cells covered with cilia. The epithelial cells physically and biochemically resemble hair cells.
- Demonstrated epithelial cells can form synapses with SGNs and integrate into whole dissected cochleas. The neural stem cells from the lateral ventricle can develop into neurons that function similarly to SGNs and form working synapses. Adult stem cells, therefore show potential as therapeutic agents for treatment of hearing loss.

RELATED MATERIALS

- Wei D, Levic S, Nie L, Gao WQ, Petit C, Jones EG, Yamoah EN. 2008. Cells of adult brain germinal zone have properties akin to hair cells and can be used to replace inner ear sensory cells after damage. Proc Natl Acad Sci U S A. 105(52):21000-5. Epub 2008 Dec 8.

PATENT STATUS

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OTHER INFORMATION

KEYWORDS

hearing loss, deafness, cochlea, ependymal cells, hearing restoration, neural stem cells, spiral ganglia neurons, SGN

CATEGORIZED AS

- **Medical**
  - Therapeutics

RELATED CASES

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Country	Type	Number	Dated	Case
United States Of America	Issued Patent	8,962,314	02/24/2015	2009-317

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