Recent and Eagerly Anticipated Advances in Hearing Disorders

American Hearing Research Foundation gala -- 2006

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Recent advances

- Meniere’s disease
  - Uncommon disorder (1/2000)
  - Hearing loss, tinnitus, and vertigo
  - Chronic disease

Hydrops
Meniere’s disease
Old treatment paradigm

- Salt restriction and/or diuretic
- Vestibular suppressants for dizziness
- Destroy inner ear for severe cases
  - Often results in deafness
New treatment

- Low dose Gentamicin
- Injection into ear
- 80% effective
- No side effects
Low-dose gentamicin is a remarkable advance

- Better quality of life for Meniere’s sufferer’s
- Less or no medication
- No damage to ear from treatment itself
Present
and near future: Bionic ears

- Cochlear implant – for bilateral deafness
- Remarkable advance
- Restores hearing
Bilateral vestibular loss can be equally disabling
Vestibular implant - for bilateral vestibular loss
Prosthetic Semicircular Canal
Being developed at Mass Eye/Ear

Source: Rick Lewis, MEEI
10 years - Hair cell regeneration

- Since 1970’s, known that Sharks, Frogs and Birds can re-grow their hair cells in inner ear
10 years - Hair cell regeneration

- Experiment: Give a bird a drug that kills inner ear
- Result: deaf bird
- Wait 4 months
- Result: bird hears again
Birds and People are not that different

It should be possible to turn on the same gene that Birds/Sharks/Frogs use in people, and regenerate the inner ear.
Early research (2003)

- Hair cells regenerated in Guinea pigs
- By injection of a gene (math1) into the inner ear, scientists coaxed the ears of normal adult guinea pigs to sprout new hair cells.

Regeneration in deaf mammals (guinea pigs), 2005

- The same group improved hearing in deaf animals using similar method
- Demonstration of cellular and functional repair in the ear of a mature deaf mammal.

Hair Cell Regeneration

- Huge potential benefit!
  - Eliminate need for most hearing aids
  - No need for cochlear implant
  - Eliminate one class of dizziness by regrowing inner ear
The Future Looks Promising for Hearing!

- Better treatments
- Technical advances
- Regeneration

- Support Hearing Research!