Biological Therapies - from Improvements Towards a Cure

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Disclosure: I am a paid consultant of Inception 3, Inc.
Existing hearing loss treatments

Cochlear implant

Hearing aids

Middle ear / conductive (example for surgery)
Many cases of human hearing loss are linked to loss of hair cells.

Basal turn section of left ear of a 66-year-old male who lost hearing after aminoglycoside administration. Nerve fibers appear normal, organ of Corti is atrophic, hair cell loss. From: Hinojosa et al., 2001, The Laryngoscope 111
Hair cell loss

Illustrations: Chris Graalep

Synaptopathy

Aka: hidden hearing loss

Nerve

Inner hair cell

LSR/HT

HSR/LT

http://www.bionicsinstitute.org/students/Pages/Student-project-details-2013.aspx (modified)
Decline of cochlear function

Causes:
Aging, Stress / Susceptibilities, Genetics, Ototoxic drugs, Noise,…

Affected cochlear structures:
• Outer hair cells
• Inner hair cells
• Synapses
• Afferent nerve fibers
• Stria vascularis
• Other
Biological treatments

Will NOT be a one-size-fits-all solution

But rather individual approaches that specifically target distinct defects

Some solutions are closer to clinical trials than others
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New drugs: efficacy, delivery, (safety)
Stem cells: efficacy, safety, delivery
Gene therapy: Atoh1 and “repair”
Of course: advances in cochlear implant technology
A matter of time

- Outer hair cell regeneration
- Inner hair cell regeneration
- Synapse restoration
- Afferent nerve fiber restoration
- Stria vascularis restoration
- Other
https://med.stanford.edu/ohns.html

https://hearinglosscure.stanford.edu

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