Tool for controlled drug delivery into the inner ear that avoids cochlea injury and preserves hearing

Inner ear therapy remains an unrealized opportunity as there is an absence of technology for reliable delivery. Current methods for drug delivery into the inner ear rely on passive diffusion of material following intratympanic injection across the round window membrane (RWM) – a structure designed to serve as a barrier between the middle ear and the inner ear. Not surprisingly, intratympanic delivery of therapeutic material for passive delivery across RWM is associated with variable efficacy, poor patient outcomes, and surgical complications. A tool has been developed to facilitate delivery of pharmaceutical, molecular and cellular agents directly into the inner ear. Produced using microfabrication technology, the tool modifies the RWM to permit inner ear therapy.

Round Window Membrane Tool creates controlled path for drug delivery into the inner ear without damaging the cochlea

The inventors have performed in-depth studies of the RWM using nano-indenter, micro-CT, and laser interferometry to define its anatomy and mechanical properties to create the novel tool for inner ear delivery. Enhancement of inner ear delivery by the RWM tool has been demonstrated through animal in vitro and in vivo testing. Additionally, the use of the tool does not cause inner ear trauma and hearing is preserved.

Lead Inventors:

Jeffrey W. Kysar, Ph.D., Professor Mechanical Engineering
Anil K. Lalwani, MD, Professor of Otolaryngology

Applications:

- Creates a controlled, safe path for intracochlear drug delivery
- Drug delivery method that minimizes patient injury, maintains hearing, and improves recovery time.
- The tool could be used for epidermal treatments or other sensitive areas of the body that require controlled applications of force for direct drug delivery, such as transdermal applications.
Advantages:

- No existing technology can directly and safely inject drugs into the inner ear and cochlea.
- Minimizes patient injury during treatment and improves patient recovery time.
- Preserves hearing.
- Offers two methods for direct intracochlear application of drugs.
- Utilizes existing microfabrication technologies.
- Method developed for intracochlear drug delivery could be used in other sensitive areas of the body.

Patent information:

Patent Pending

Licensing Status:

Available for licensing and sponsored research support

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Related Publications:

Inventors

Jeffrey W. Kysar