Docket #: S20-383

Non-Invasive Diagnosis and Treatment of Ear Diseases by Nanoparticle-based Delivery Reagents

Ear infections are a serious condition, especially in children, and represent a $4B market. Otitis media (OM) is when the middle ear becomes inflamed and affects 90% of children worldwide. Without accurate diagnosis and treatment, OM could lead to further complications, such as speech and language impediment, brain abscesses, meningitis, and permanent hearing loss.

The current standard of care for OM diagnosis is pneumatic otoscopy to detect the presence of fluid in the middle ear. This is highly error-prone and a better method could readily supplant this diagnostic technique. For OM treatment, on the other hand, one has to surgically insert a tube into the tympanic membrane and suction out the fluid, or administer high dose antibiotics systemically or orally. Neither are ideal for patient outcomes or experience. An effective method for local and concentrated delivery (for both diagnosis and treatment) is missing.

We have developed an ear drop based on liposomal nanoparticles that penetrate the eardrum without an incision and can deliver therapeutic agents and/or contrast agents to the middle ear/inner ear chamber. Liposomes are the first FDA-approved nanomedicines for clinical trials, bio-compatible (i.e., non-toxic) and bio-degradable, making them safe for administration to pediatric patents.

Applications

- Novel approach to deliver therapeutic and imaging reagents via ototopical delivery

- Rapid and simple diagnostic or therapy for middle/inner ear infections and diseases

Advantages

- Advanced liposomal vesicle carriers of either contrast, therapeutic agents, or both
- Ease of administration, especially for pediatric patients
- Painless and risk-free alternative to surgery
- Biocompatible, non-toxic, and biodegradable
- Noninvasive and direct application via ear drop

Patents

- Published Application: WO2022081955
- Published Application: 20230285294
- Issued: 12,778,888 (USA)

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