[0055] In some embodiments, the otic and/or vestibular disorder is otitis externa, otitis media, Ramsay Hunt syndrome, otosyphilis, AIED, Meniere's disease, or vestibular neuronitis. In some embodiments, administration of any antimicrobial composition or device described above reduces the risk of development of antibiotic resistance.

[0055a] Also disclosed herein is the use of a composition in the manufacture of a medicament for the treatment of an otic disease or condition comprising a thermoreversible gel and a micronized antimicrobial agent;

wherein the thermoreversible gel comprises a copolymer of polyoxyethylene and polyoxypropylene, having a gelation temperature of between 19°C and 42°C;

wherein the composition is to be administered by intratympanic injection; and

wherein the composition provides a sustained release of the antimicrobial agent in the ear for a period of at least 5 days after a single intratympanic injection.

BRIEF DESCRIPTION OF FIGURES

[0056] **Figure 1.** illustrates a comparison of non-sustained release and sustained release formulations.

[0057] **Figure 2** illustrates the effect of concentration on the viscosity of aqueous solutions of Blanose refined CMC.

[0058] **Figure 3** illustrates the effect of concentration on the viscosity of aqueous solutions of Methocel.

[0059] **Figure 4** illustrates the anatomy of the ear

[0060] **Figure 5** shows predicted tunable release of an active agent from four compositions.

DETAILED DESCRIPTION OF THE INVENTION

[0061] Provided herein are controlled release antimicrobial agent compositions and formulations for the treatment of otic disorders, including otitis externa, otitis media, Ramsay Hunt syndrome, otosyphilis, AIED, Meniere's disease, and vestibular neuronitis. In some embodiments, the antimicrobial agent is an antibacterial agent, an antifungal agent, an antiviral agent, an antiprotozoal agent, and/or an antiparasitic agent. In certain embodiments, the antimicrobial agent is a protein, an antibody, DNA, a carbohydrate, an inorganic compound, an organic compound, or combinations thereof. In certain particular embodiments, the antimicrobial agent is a small organic molecule. Compositions comprising combinations of therapeutic agents useful for the treatment of otic disorders, including combinations of different antimicrobial agents, as well as combinations of

antimicrobial agents with other therapeutic agents, are also encompassed in certain embodiments disclosed herein.

[0062] Otitis externa (OE), also referred to as swimmer's ear, is an inflammation of the external ear and/or ear canal. OE is primarily caused by bacteria (e.g., *Pseudomonas aeruginosa* and *Staphylococcus aureus*) or fungi (e.g., *Candida albicans* and *Aspergillus*) in the outer ear, which establish infection following damage to the skin of the ear canal. Symptoms of OE include otalgia, swelling, and otorrhea. If the condition progresses significantly, OE may cause temporary conductive hearing loss as a result of the swelling and discharge. Treatment of OE involves eliminating the aggravating pathogen from the ear