# Preventing ear infections in the future: Delivering vaccine through the skin

May 21 2009

An experimental vaccine applied the surface of the skin appears to protect against certain types of ear infections. Scientists from the Research Institute at Nationwide Children's Hospital in Columbus, Ohio, report their findings today at the 109th General Meeting of the American Society for Microbiology in Philadelphia.

"Our data are the first to show that transcutaneous immunization is an effective way to prevent experimental ear infections and lays the foundation for an effective, yet simple, inexpensive - and potentially transformative - way to deliver vaccines," says Laura Novotny, one of the study researchers.

Nontypeable *Haemophilus influenzae* (NTHi) is one of the three main bacterial causes of otitis media (OM), an infection or inflammation of the middle ear. OM is one of the most significant health problems for children in the United States, costing approximately $5 billion annually. It is estimated that 83% of all children will experience at least one ear infection prior to 3 years of age.

Currently infections are managed with antibiotics; however, the emergence of antibiotic-resistant microorganisms is of concern. Surgery to insert tubes through the tympanic membrane relieves painful symptoms, but the procedure is invasive and requires the child to be under general anesthesia. Thus, it is necessary to develop different ways to treat or preferably prevent this disease.

"We have designed several vaccine candidates which target proteins on the outer surface of this bacterium. Previous work in our lab showed that after immunization by injection, each of the three vaccine candidates prevented experimental ear infections caused by NTHi. In this study, we now wanted to test an alternative but potentially equally effective method to deliver a vaccine," says Novotny.

The method, known as transcutaneous immunization, involved placing a droplet of each vaccine onto the ear and rubbing it into the skin.

In this study, four groups of chinchillas were immunized with one of the three vaccine candidates. A fourth group received a placebo. Each vaccine was placed on the ears of chinchillas once a week for three weeks. All animals were then inoculated with NTHi through the nose and directly into the middle ears. Animals that received the vaccines were able to very rapidly reduce, or completely eliminate NTHi from the nose and ears, but animals that received a placebo did not.

Source: American Society for Microbiology