

Siderophore-based Immunization Against Gram-negative Bacteria

Technology #16976

Applications

Siderophore-based immunization holds promise as a new vaccine strategy against pathogenic bacteria in humans and other animals. Its principles may also be applied to produce antibodies for passive immunization. These antibodies may be applied to a variety of conditions, including irritable bowel syndrome.

Problem Addressed

Salmochelins are highly conserved small metal ion chelators, also known as siderophores, synthesized by pathogenic gram-negative bacteria (*E. coli*, *Salmonella enterica*, and certain *Klebsiella* strains) in the stomach and small intestines. Salmochelins are vital to the survival of these pathogenic strains, and because they cannot be bound and destroyed by the host organism's natural response system, they enhance bacterial virulence. The ability to introduce immunogenic carrier proteins to salmochelin-producing strains of bacteria would provide general immunization against all of these pathogenic strains simultaneously.

Technology

This invention involves the production, application, and uptake assessment of salmochelin conjugated with cholera toxin B (CTB) or keyhole limpet hemocyanin (KLH), immune-stimulating carrier proteins. The conjugates were produced with PEG3 linkers connected CTB to the salmochelin using a peptide coupling strategy to bond lysine residues on the carrier protein to a free carboxylic acid on the PEG3 linker. Mice immunized intranasally with the conjugate were observed to possess antibodies against salmochelin in circulation for up to 51 days after the first immunization, with a novel ELISA. Immunized mice showed less weight loss after infection with *Salmonella typhimurium* and colonization within the intestines of the infected mice correlated with the amount IgA detected in the novel ELISA. Finally, microbiota assessment of the immunized mice revealed substantially lower levels of the pathogenic *Salmonella* and higher levels of beneficial microbes like *Lactobacillus*.

Advantages

- Conservancy of siderophore genes amongst multiple pathogenic bacterial strains makes siderophores attractive targets for immunizations
- Siderophore-based immunization may be applicable to *E. coli* and *Klebsiella* in addition to *Salmonella*
- Potential increase in beneficial microbiota after immunization
- Production of antibodies for passive immunization, which may be of therapeutic value to conditions such as irritable bowel syndrome

Related Technologies

Related to Technology #16939, [Salmochelin-Antibiotic Conjugates For Targeting Gram-Negative Pathogens](#).

Categories For This Invention:

[Life Sciences](#)

[Clinical Applications](#)

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[Immunology](#)

[Infectious Disease](#)

[Inflammatory Disease](#)

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[Small Molecule](#)

Intellectual Property:

Siderophore-based immunization against gram-negative bacteria

Issued US Patent

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