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UIRF Case Patent Filings: Lipid A Deficient Mutants of Neisseria Meningitidis

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A Live Cell Vaccine for Neisseria meningitidis

A modified N. meningitidis expressing reduced lipooligosaccharide (LOS) limits pathogen virulence and stimulates a therapeutic immune reaction.

Technology Primer:

N. meningitidis is the main cause of bacterial meningitis, an infection that can become severe and result in brain damage, hearing loss, or loss of limbs. Even with early diagnosis and treatment (antibiotics and palliative), there is a 5-15% chance of death and those that survive have a 10-20% chance of severe long-term effects of the disease. There are two FDA-approved vaccines for N. meningitidis on the market - Meningococcal polysaccharide vaccine (MPSV4 or Menomune) & Meningococcal conjugate vaccine (MCV4). Neither of these vaccines are effective against all known serogroups of N. meningitidis.

Technology Benefit:

LIVE VACCINE. This vaccine consists of wild-type N. meningitidis cells with a key mutation that prevents creation of the pathogen's core virulence factor. Without that factor, the bacteria is weakened to the extent that the patient is able to establish a multi-targeted prophylactic immune reaction that protects against future exposure.

POTENTIALLY EFFECTIVE ACROSS SEROGROUPS. Any of the various serogroups of N. meningitidis could be modified with this mutation and included in the vaccine preparation to elicit broad-spectrum immune protection.

Technology Description:

Researchers at the University of Iowa have identified and mutated a key enzyme in the production of LOS in N. Meningitidis. LOS, the key virulence factor in N. Meningitidis, is the principle glycolipid present in the outer membrane of the pathogen and is composed of oligosaccharide chains, the core, and lipid A. The lipid A portion of this structure is known to be the element responsible for many of the adverse effects seen with gram-negative bacterial infections. msbB, an acyl transferase responsible for secondary acyl substitutions in the lipid A, is the bacterial gene that researchers modified to limit the effects of LOS. This modification results in an LOS with reduced toxicity as well as a reduced ability to stimulate cytokine secretion. Bacterial cells that have been modified in this manner appear to be attenuated enough to serve as effective bacterial vaccines.

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Complementary Technologies:

07074 - Immunogenic Compositions for Activating Gamma Delta T-cell...
01025 - A Phospholipase D-based Vaccine for Neisseria Gonorrhoeae
98037 - A Neisserial Species Vaccine Based on Control of Membrane ...

Category: Life Sciences & Medical

Primary Sub-Category: Vaccine

Secondary Sub-Categories:

Anti-bacterial
Biotechnology
Immune System

Pharmaceuticals & Therapeutics

Proteins
Vaccine