UNIVERSITY OF GEORGIA
Center for Vaccines And Immunology

Platform to Easily Generate Novel and Safe Lipid A Adjuvants

INVENTION: The inventors have genetically engineered *E. coli* to synthesize the MPL lipid A structure on its surface. MPL can be harvested directly from this bacterium without risk of contamination with other potentially toxic lipid A species, eliminating the need for subsequent chemical processing. This method promises to be substantially cheaper and faster than current methods of producing MPL.

In addition to this MPL-producing strain, the inventors have genetically engineered *E. coli* strains expressing a wide range of lipid A profiles. Each lipid A variant elicits a unique profile of cytokine production and TLR4 responses, allowing the adjuvant to be tailored to achieve the desired immune response for a specific vaccine. In addition to the production of adjuvant, these strains can also be used for the production of safe whole cell vaccines.

APPLICATIONS:

- Adjuvants for diverse profile of pre-existing and new generation vaccines

ADVANTAGES:

- Easy and cost-effective production of MPL
- Reduced risk of toxicity
- 64 *E. coli* strains producing unique lipid A species, including MPL
- Strong humoral and cellular immune response

STAGE OF DEVELOPMENT: mouse and non-human primate data available for Influenza and other pathogens

BACKGROUND: Monophosphoryl lipid A, or MPL, is the first vaccine adjuvant to be approved by the FDA since the 1930s and is currently present in the widely used Human Papilloma Virus (HPV) vaccine Cervarix®. MPL provides many advantages over the prevailing adjuvant of aluminum salts—namely, the ability to stimulate the cellular immune response. Activation of the cellular immune response leads to destruction of cancerous or infected cells, making lipid A adjuvants particularly good candidates for cancer vaccines. Currently, MPL is produced by harvesting LPS from *Salmonella minnesota*, followed by several chemical processing and purification steps to achieve pure MPL.

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PATENT STATUS: U.S. patent issued: 8,945,587

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