

GEOMV: BACTERIAL VACCINE DEVELOPMENT PLATFORM USING GLYCOENGINEERED MICROBES

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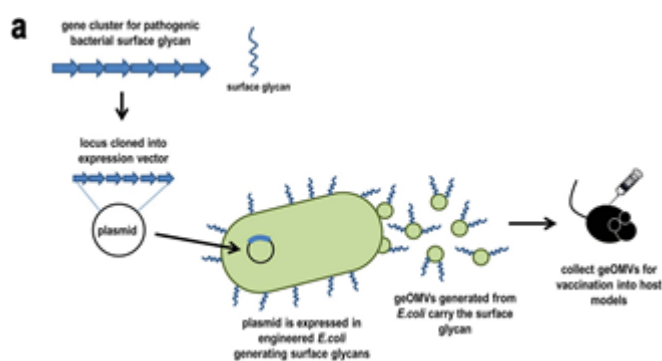
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Technology Description

Researchers in Prof. Mario Feldman's laboratory have developed a patented, versatile, cost-effective platform for creating new multivalent vaccines for a variety of Gram-negative and Gram-positive bacteria. This technology, glycoengineered outer membrane vesicles (geOMV), could be particularly useful for developing vaccines for large animals and proof of principle was demonstrated with two different animal pathogens.

geOMV utilizes non-pathogenic bacterial strains to generate immunogenic polysaccharides encoded by genes from an unrelated pathogenic organism. This approach could avoid the pitfalls of conventional conjugate vaccines to potentially accelerate development times, lower costs and prevent batch-to-batch variability in production. Furthermore, the geOMV could possibly incorporate adjuvant species (such as Monophosphorylated lipid A) to optimize the balance between reducing toxicity and enhancing adjuvanticity.

Traditional OMVs have proven effective vaccine candidates, exemplified by MeNZB for bacterial meningitis. geOMV could extend this strategy to prevent infections from Gram-positive bacteria that do not naturally produce immunogenic polysaccharides in this form. This could be especially useful in the context of the alarming increase of multidrug resistance.



Overview of geOMV platform. Gene for the glycan structure of interest is cloned into an engineered *E. coli* strain which generates OMVs that display the glycan. The geOMVs can then be collected and directly utilized for immunizations.

Stage of Research

The inventors demonstrated proof of principle and efficacy of geOMVs as vaccines against *S. pneumoniae* in mice and *C. jejuni* in chickens.

Publications - Price, N. L., Goyette-Desjardins, G., Nothaft, H., Valguarnera, E., Szymanski, C. M., Segura, M., & Feldman, M. F. (2016). Glycoengineered outer membrane vesicles: a novel platform for bacterial vaccines. *Scientific reports*, 6, 24931.

Applications

- **Vaccines** for a variety of bacterial infections in animals and humans

Key Advantages

- **Accelerated vaccine development** – new geOMV strains can be developed more quickly than conjugate vaccines
- **Uniform saccharide production in non-pathogenic bacterial strains:**
 - no batch-to-batch variability from chemical crosslinking of sugars to protein
 - no culturing of pathogenic microbes
 - engineered antigens could potentially be designed to tightly control the balance of toxicity and adjuvanticity
- **Versatile platform** for developing vaccines to both Gram-negative and Gram-positive infections, with potential to protect against multi-drug resistant strains

Patents - [Glycoengineered outer membrane vesicles and use thereof as vaccines](#) (U.S. Patent No. 9,526,775)

Related Web Links – Feldman [Profile](#) and [Lab](#)