

Bacterial Lipid Nanodiscs Platform

Value Proposition

The Bacterial Lipid Nanodiscs Platform developed by Los Alamos National Laboratory provides a new way to study entire bacterial membranes in a controlled, nanoscale format derived directly from native lipid extracts. The platform offers a safer alternative to handling live high risk pathogens while preserving the biological context that drives meaningful insights for vaccine design and antimicrobial discovery such as therapeutic antibodies to conserved lipids on bacterial membranes.

Technology Readiness Level 3

IP Information for S-191192

U.S. Patent pending

Contact Information

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Overview

The Bacterial Lipid Nanodiscs Platform creates uniform nanoscale discs from total lipid extracts harvested from bacterial membranes. Membrane scaffold protein MSP1D1 encases the lipid mixture and forms a stable disc roughly 10 nanometers wide. The resulting particles retain the full complement of native bacterial lipids, arranged in a membrane like environment that supports realistic biological interactions without requiring synthetic lipids or live cells.

Technology Description

The method adapts established nanodisc assembly techniques to incorporate entire bacterial lipid extracts rather than defined synthetic lipid mixtures. Total lipids from a pathogen are solubilized, combined with MSP1D1 and dialyzed under controlled conditions to allow the scaffold protein to form a discoidal structure around

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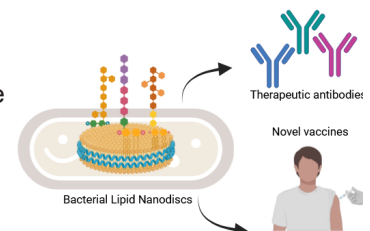


the heterogeneous lipid population. The process yields nanoparticles that represent the membrane environment of the source organism, including amphiphilic molecules that typically resist purification or structural study when isolated from their native context.

The approach was demonstrated using *Yersinia pestis*, chosen to illustrate how membrane characterization can proceed without the hazards associated with live Tier 1 pathogens. The method captures lipopolysaccharides (LPS) and diverse immunogenic lipids in an arrangement that mirrors their natural organization. Researchers can evaluate binding interactions, immune stimulating properties and potential antigenic targets in a stable platform that avoids the limitations of outer membrane vesicle purification. Furthermore, using this platform we have identified antibodies specific to *E. coli* LPS and *Y. pestis* membrane lipids. These antibodies are independently licensable.

Advantages

- Provides membrane like structures using native bacterial lipids
- Avoids the safety challenges of handling live pathogens
- Offers a broader and more realistic lipid environment than synthetic nanodiscs
- Enables improved assessment of membrane antigens and immune responses
- Supports analysis of diverse bacterial species using a unified workflow
- Creates consistent nanoscale particles suitable for research and development settings



Market Applications

- **Life Sciences Research** (membrane biology, immunology)
- **Vaccine Development** (bacterial antigen discovery)
- **Drug Discovery** (membrane associated targets)
- **Diagnostics** (lipid biomarker exploration)
- **Biodefense Research** (safe pathogen characterization)