Docket #: S21-400

Chemically Modified Bacterial Peptidoglycan Compositions and Uses thereof

Technology Reference
CZ Biohub SF ref. no. CZB-231S
Stanford ref. no. S21-400

Researchers at Stanford have developed a new microparticle vaccine scaffold for the development of immunogenic subunit vaccines.

Vaccines are one of the most important biomedical advances of the 20th century. Protein vaccines, often referred to as subunit vaccines, have proved to be a particularly useful vaccine strategy. Subunit vaccines have been licensed for the prevention of infectious diseases such as HPV, hepatitis B, and influenza. To assist immunogenicity, subunit vaccines are often administered with adjuvants, carrier proteins or nanoparticles. While these co-administered factors often help with immunogenicity, they often create problems for the scalability of these vaccines.

Stage of Development
Research -

in vivo

Stage of Research
The inventors have developed a new scaffolding method for eliciting immunogenicity in subunit vaccines. Specifically, the inventors devised strategies for the purification and conjugation of peptidoglycan (PGN) microparticles from several bacterial strains. PGN is easily purifiable, naturally immunogenic, and readily biodegradable, making it an ideal candidate as a vaccine scaffold. This system uses optimized Staphylococcus aureus PGN microparticles containing azido-D-alanine which is highly manipulatable and creates strong conjugations to immunogens of interest.

Furthermore, these PGN microparticles conjugated to protein subunits yielded immunogenic responses similar to those of conventional carrier proteins such as keyhole limpet hemocyanin (KLH). When PGN microparticles were conjugated to the receptor binding domain (RBD) of SARS-CoV2, this subunit vaccine was shown to produce comparable neutralizing antibody titers to those produced by KLH-conjugated RBD, demonstrating the effectiveness of this novel vaccine scaffold.

Applications

- Novel protein scaffold for subunit vaccines

Advantages

- PGN is readily biodegradable while maintaining robust immunogenicity.
- PGN microparticles are highly stable and comprise a scalable subunit vaccine conjugation platform

Publications

- Payton A.-B. Weidenbacher, Frances P. Rodriguez-Rivera, Mrinmoy Sanyal, Joshua A. Visser, Jonathan Do, Carolyn R. Bertozzi, Peter S. Kim. "Chemically Modified Bacterial Sacculi as a Vaccine Microparticle Scaffold." ACS Chem Biol. 2022 May 20;17(5):1184-1196.

Patents

- Published Application: WO2023129822
- Published Application: 20250064921

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