POLSKY Center for Entrepreneurship and Innovation
THE UNIVERSITY OF CHICAGO

Synthetic Peptide-Adjuvant Produces Robust Immune Response and Precise Dosing for Multi-component Vaccine

SUMMARY

Researchers have developed heat-resistant peptide nanofiber (Q11) that generates an enhanced antibody response without excess inflammation at the site of injection that is often associated with current adjuvants. Q11 peptides are conjugated to the antigens, providing a single-component antigen-adjuvant vaccine and potentially a safer adjuvant.

KEY RESULTS

An *in vivo* proof-of-concept murine study demonstrated enhanced antibody (IgG) production to different antigens from *Staphylococcus aureus, Mycobacterium tuberculosis,* and canonical OVA antigens. Addition of PADRE-Q11, a T-helper-cell antigen, to the fibril complex further boosted antibody production to *S. aureus* antigens, demonstrating the possibility of stimulating multiple immune cells using one composition.

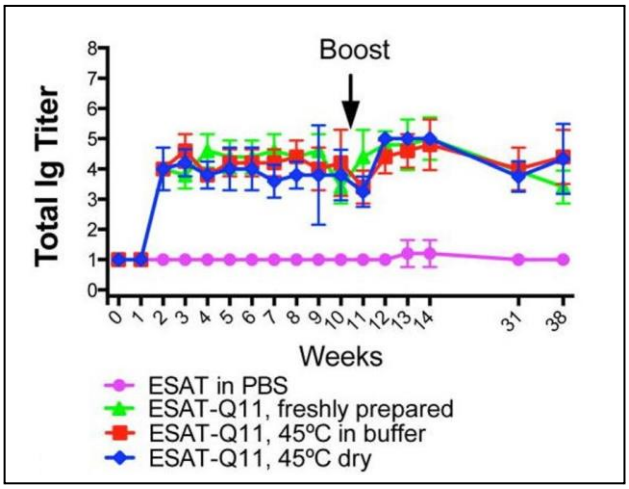
ADVANTAGES

- Dosing precision for T- and B-cell stimulation.
- Reduces inflammation without diminishing efficacy.
- Thermostability extends shelf-life.
- Controlled fibril formation prior to administration.

APPLICATIONS

- Co-synthesis of adjuvant and antigen provides a single antigen-adjuvant immune stimulator.
- Effective antibody response for difficult, non-immunogenic antigens.
- Platform for combining multiple antigens, allowing for a single-dose multi-component vaccine

Q11 produces a robust, durable antibody response and is heat stable



Self-assembled Q11 fused to M. tuberculosis antigen, ESAT (ESAT-Q11), produced robust IgG antibody titers compared to unadjuvanted ESAT. ESAT-Q11 vaccine peptides heated to 45 C maintained efficacy, demonstrating the vaccine's thermostability. Mice were received an immunization boost on day 10.

TECHNICAL DESCRIPTION

Fibrillizing peptides elicit strong, specific antibody responses without the need for supplemental adjuvants that may cause negative side effects. Researchers developed a recombinant fibrillizing peptide (Q11) that generates a fine-tuned immune response to a plurality of antigens. The Q11 peptide self-assembles into nanofibrillar structures and enables the tandem display of one or more epitopes on the fibril surfaces to generate a multivalent immune response that can stimulate both B-cells and T-helper-cells to yield improved antibody production and vaccination. The relative magnitudes of the B-cell and T-cell responses can be tuned to maximize antibody production by controlling the precise concentration of these antigens in a fibril complex. The peptide adjuvant provides a potentially safer vaccine compared to the traditional chemical-based adjuvants.

REFERENCE
UCHI 1877, 2079

DEVELOPMENT STAGE
Proof-of-concept

THERAPEUTIC AREAS
Vaccines
Antibody production
Infectious Disease
Oncology

PUBLICATION
Sun et al. *Acta Biomater.* 2015.

INTELLECTUAL PROPERTY
US 9,241,987
US 9,200,082

INVENTOR(S)
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Dr. Joel Collier is a recipient of a Bill and Melinda Gates Grand Challenge Explorations Award for his innovative work on self-assembling peptides and a Chicago Biomedical Consortium Lever Award for his contribution to nanomaterials. He is currently an associate professor at Duke University.

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