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Multivalent influenza vaccine using recombinant outer membrane vesicles

Project Number
1R43AI141055-01A1

Contact PI/Project Leader
LOCHER, CHRISTOPHER

Awardee Organization
VERSATOPE THERAPEUTICS, INC.

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Description

Abstract Text

Abstract A universal influenza vaccine that protects against all strains of influenza is a high priority. The Centers for Disease Control & Prevention (CDC) estimate the economic impact of seasonal influenza in the United States ranges from $10 to $16 billion and **pandemic** influenza ranges from $71.3 to $166.5 billion. The proposed research directly addresses the limitations of both **pandemic** and seasonal flu vaccines. Versatope has developed a unique influenza M2e antigen construct that is potentially effective against several strains of influenza in mouse and ferret animal models. It is expressed in Escherichia coli and derived from recombinant outer membrane vesicles (rOMVs) or M2e-rOMVs. The ferret study showed higher levels of antigen- specific antibodies and lower viral loads of **pandemic** H1N1 influenza following prime/boost administration of M2e-rOMVs compared to a commercially available influenza vaccine. The OMV vaccine delivery is innovative because our E. coli production strain has been genetically engineered to detoxify lipopolysaccharide (LPS) more than 1000-fold (they do not require chemical extraction of LPS to detoxify the final product) and to increase OMV formation more than 30-fold compared to the parental probiotic strain of BSL1 bacteria. Since it is known that influenza undergoes antigenic variation under immunologic selection, the M2 ectodomain may not be a sustainable vaccine candidate for long-term preventative applications in humans. Although our current M2e-rOMV vaccine candidate contains diverse strain sequences from one target antigen, we propose to develop a multi-antigen influenza vaccine candidate and to demonstrate improved protection against heterologous challenge using the multivalent influenza rOMV compared to the M2e-rOMV in the mouse model. We expect that our approach using multi-antigen (conserved domains from representative hemagglutinin, neuraminidase and nucleoprotein together with M2 ectodomains) influenza construct will yield stable rOMVs and provide with protection against multiple influenza strains. OMVs are ideally suited for a multi- valent vaccine because recombinant proteins can be expressed as fusion proteins and/or independently targeted to the lumen, the membrane, or the surface of OMVs. Our proposed research program is primarily translational, the outcome of which will guide the path toward a viable single-dose vaccine for **pandemic** influenza A. The development of this new multivalent influenza-rOMV will enable large-scale production suitable for non-clinical development and toxicology, clinical studies, and commercial development. We will also identify the minimum dose required for immunogenicity for future safety/toxicity studies. These rOMVs represent a potentially safe and simple subunit vaccine delivery platform that will increase the range of protection against multiple strains of **pandemic** and seasonal influenza and reduce the overall economic impact.

Public Health Relevance Statement

Project Narrative Versatope is developing a universal influenza vaccine candidate capable of protecting against all strains of influenza and has already demonstrated a significant improvement over commercial influenza vaccine candidates, with immunity imparted to multiple strains. The proposed project will continue the high priority work of developing a new multivalent and universal influenza vaccine capable of protection against multiple strains of pandemic influenza and suitable for large scale commercial production.

NIH Spending Category

Biodefense **Biotechnology** **Emerging Infectious Diseases** **Immunization** **Infectious Diseases** **Influenza** **Pneumonia & Influenza** **Prevention** **Vaccine Related**

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Centers for Disease Control and Prevention (U.S.) Chemicals Chimeric Proteins Clinical Research Complex Cytotoxic T-Lymphocytes Development Dose Escherichia coli Ferrets Fluvirin Foundations Future Genetic Genetic Engineering Glycoproteins Hemagglutinin Human Immune response Immunity Immunologics Inbred BALB C Mice Individual

Read More

Details

Contact PI/ Project Leader

Name
LOCHER, CHRISTOPHER

Title
CHIEF EXECUTIVE OFFICER

Contact
christopher.locher@versatope.co

Other PIs

Not Applicable

Program Official

Name
GORDON, JENNIFER L

Contact
jennifer.gordon2@nih.gov

Organization

Name
VERSATOPE THERAPEUTICS, INC.

City
Lowell

Country
UNITED STATES (US)

Department Type
Unavailable

Organization Type
Domestic For-Profits

State Code
MA

Congressional District
03

Other Information

FOA
PA-18-574

Study Section
Special Emphasis Panel[ZRG1 IMM-R (12)]

Fiscal Year
2019

Award Notice Date
04-April-2019

Administering Institutes or Centers
NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES

DUNS Number
080564097

CFDA Code
855

Project Start Date
05-April-2019

Project End Date
31-December-2020

Budget Start Date
05-April-2019

Budget End Date
31-December-2020

Project Funding Information for 2019

Total Funding
$224,974

Direct Costs
$0

Indirect Costs
$0

Year	Funding IC	
2019	NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES	$224,974

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Emerging Infectious Diseases; Immunization; Infectious Diseases; Influenza; Pneumonia & Influenza; Prevention; Vaccine Related;

Sub Projects

No Sub Projects information available for 1R43AI141055-01A1

Publications

No Publications available for 1R43AI141055-01A1

Patents

No Patents information available for 1R43AI141055-01A1

Outcomes

The Project Outcomes shown here are displayed verbatim as submitted by the Principal Investigator (PI) for this award. Any opinions, findings, and conclusions or recommendations expressed are those of the PI and do not necessarily reflect the views of the National Institutes of Health. NIH has not endorsed the content below.

No Outcomes available for 1R43AI141055-01A1

Clinical Studies

No Clinical Studies information available for 1R43AI141055-01A1

News and More

Related News Releases

No news release information available for 1R43AI141055-01A1

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Similar Projects

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