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Novel Influenza nano vaccines for broad cross protection

Project Number
5R01AI101047-08

Contact PI/Project Leader
WANG, BAOZHONG

Awardee Organization
GEORGIA STATE UNIVERSITY

Description

Abstract Text

SUMMARY Influenza is a major public health risk. The current seasonal influenza vaccine is effective against closely matched viruses in healthy adults, but it cannot prevent the outbreaks of epidemics or pandemics because influenza viruses mutate frequently and zoonotic strains can jump the species barrier into humans. Other disadvantages of the seasonal influenza vaccine include the need to produce new vaccines every season, the uncertainty in selecting vaccine strains, and the compromised efficacy for mismatched viruses. A novel generation of influenza vaccines, termed universal influenza vaccines, will overcome these challenges. In the previous grant period, we have produced layered protein nanoparticles (nanoclusters) from conserved HA stalk antigens and the M2 protein ectodomain of influenza A. Nanocluster immunizations induced cross protection against viruses from both phylogenic groups of influenza A, including **pandemic-potential** avian strains. Both influenza A and influenza B cause influenza epidemics in humans. In this proposal, we propose to construct a multivalent layered nanocluster formulation composed of newly designed antigenic proteins from both influenza A and influenza B as a universal influenza vaccine. The new vaccine will induce broad cross- protection against both influenza types. We have three specific aims: Aim 1. To design and construct conserved antigens from influenza A and B, fabricate nanoclusters from these and previously designed antigenic proteins, and characterize these new nanoclusters. We will optimize the orchestration, composition, and stability of these nanoclusters for the physiologically-activated release of free antigenic proteins, antigen-processing and presentation after the uptake by dendritic cells, distribution of these nanoclusters to draining lymph nodes, and induction of strong antigen-specific immune responses in mice. Aim 2. To test whether these layered nanoclusters or an optimal combination will induce broadly reactive immune responses and whether the immunity will grant cross-protection against viruses spanning both influenza A and influenza B in mice. Aim 3. To test whether the leading multivalent nanocluster combinations will induce robust immune responses which confer broad cross-protection in ferrets. Overall, our research will develop a broadly cross-protective universal influenza vaccine.

Public Health Relevance Statement

Narrative： Influenza is the leading cause of death by infection. We will develop a protein nanoparticle universal influenza vaccine composed of newly designed influenza antigens from both influenza A and influenza B to induce broadly reactive immunity. The implementation and success of the project will improve public health by granting broad cross-protection against both influenza epidemics and pandemics.

Project Terms

Adaptive Immune System **Adult** **Animal Model** **Antibody titer measurement** **Antigen Presentation** **Antigen Presentation Pathway** **Antigen-Presenting Cells** **Antigens** **Birds** **Cause of Death** **Chimeric Proteins** **Dendritic Cells** **Disadvantaged** **Disease Outbreaks** **Drug Delivery Systems** **Epidemic** **Ethanol** **Ferrets** **Filtration** **Formulation** **Generations** **Genes** **Grant** **Head** **Hemagglutinin** **Human** **Immune** **Immune response** **Immunity** **Immunization** **Immunize** **Infection** **Inflammation** **Influenza** **Influenza A virus** **Influenza B Virus** **Innate Immune Response** **Intramuscular**

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Not Applicable

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Organization

Name
GEORGIA STATE UNIVERSITY

City
ATLANTA

Country
UNITED STATES (US)

Department Type
MISCELLANEOUS

Organization Type
ORGANIZED RESEARCH UNITS

State Code
GA

Congressional District
05

Other Information

FOA
PA-18-859

Study Section
Vaccines Against Microbial Diseases Study Section[VMD]

Fiscal Year
2021

Award Notice Date
21-June-2021

Administering Institutes or Centers
NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES

DUNS Number
837322494

CFDA Code
855

Project Start Date
15-May-2012

Project End Date
30-June-2024

Budget Start Date
01-July-2021

Budget End Date
30-June-2022

Project Funding Information for 2021

Total Funding
$630,929

Direct Costs
$449,269

Indirect Costs
$181,660

Year	Funding IC	
2021	NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES	$630,929

Sub Projects

No Sub Projects information available for 5R01AI101047-08

Publications

No Publications available for 5R01AI101047-08

Patents

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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 5R01AI101047-08

Clinical Studies

No Clinical Studies information available for 5R01AI101047-08

News and More

Related News Releases

No news release information available for 5R01AI101047-08

History

No Historical information available for 5R01AI101047-08

Similar Projects

No Similar Projects information available for 5R01AI101047-08

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