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Similar Projects

Novel delivery platform and antigen design for an effective COVID-19 vaccine

Project Number
1R01AI158177-01

Contact PI/Project Leader
MITTAL, SURESH K

Awardee Organization
PURDUE UNIVERSITY

Description

Abstract Text

PROJECT SUMMARY For effective management of the **COVID**-19 pandemic and its second wave, the design and implementation of multiple intervention approaches are crucial. They include the development of effective antivirals, high-affinity SARS-CoV-2-neuralizing human or humanized monoclonal antibodies, rapid diagnostic assays, immunogenic and protective vaccines, strategies to mitigate virus transmissibility, and enhancing capacity related to trained medical personnel, facilities, and supplies. Due to the possibility of antibody-dependent enhancement (ADE) of **COVID**-19, **vaccine** efforts should consider the use of a novel **vaccine** platform and design of a relevant antigen strategy. It is essential to note that the elderly are the most vulnerable segment of the population that is at a higher risk of **COVID**-19 severity; the **vaccine** development efforts should, therefore, consider the decline in the immune competence in the elderly. We have developed a novel replication-defective (E1 & E3 deleted) bovine adenovirus (Ad) type 3 (BAd3)- based **vaccine** platform, which is better than the currently available Ad vector systems for providing heterologous influenza protection with dose sparing and is not impacted by the pre-existing human Ad vector immunity. Recently, we have revealed that the BAd **vaccine** platform provides the expression of significantly higher levels of the immunogen and innate and adaptive immunity-related factors compared to that of human Ad vectors in mice. This work suggests that the BAd vector system could serve as an excellent delivery vehicle for the development of recombinant vaccines against emerging pathogens for the elderly and other segments of the population. We have also identified a 22 amino acid residues Autophagy-Inducing Peptide (AIP) C5 (AIP-C5) from the CFP10 protein of M. tuberculosis that enhances robust T cell immune responses in mice to NP of H7N9 influenza virus when delivered through an Ad vector. It conferred complete protection against H1N1, H3N2, H5N2, H7N9, and H9N2 influenza viruses. The proposal is based on the hypothesis that immunization with the autophagy-inducing replication-deficient BAd vector expressing relevant antigen/s of SARS-CoV-2 will strengthen an effective mucosal (lung) and systemic anti-**COVID**-19 immunity. Under Aim 1, we will evaluate the immunogenicity and protective efficacy of a novel **vaccine** platform and antigen design in animal models for developing an effective **COVID**-19 **vaccine**. Whereas under Aim 2, we will investigate the **vaccine**-induced antibody-dependent enhancement (ADE) of SARS-CoV-2 infection, the quality of memory innate, B and T cell responses, and the durability of protective immunity in the best animal model. We believe that the use of a unique nonhuman Ad **vaccine** platform and novel antigen design containing AIP-C5 will yield an effective **COVID**-19 **vaccine** for all segments of the population. This effort will be of significant value to effectively flatten the **COVID**- 19 pandemic's trajectory and its second wave.

Public Health Relevance Statement

PROJECT NARRATIVE For effective management of the COVID-19 pandemic and its second wave, the design and implementation of multiple intervention approaches are crucial. We believe that the use of a unique nonhuman adenoviral vaccine platform and novel antigen design will yield an effective COVID-19 vaccine for all segments of the population. This effort will be of significant value to effectively flatten the COVID-19 pandemic's trajectory and its second wave.

NIH Spending Category

Aging Biotechnology Coronaviruses Emerging Infectious Diseases Immunization Infectious Diseases Influenza Lung Pneumonia Pneumonia & Influenza Prevention Vaccine Related

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COVID-19 **COVID-19 pandemic** **COVID-19 vaccine** Cattle Cessation of life China Chiroptera Coronavirus Infections Country Development Dose Elderly Equilibrium Failure Feline Coronavirus Ferrets Fever Glycoproteins Health Personnel Human Immune response Immune system Immunity Immunization Immunocompetence Infection Influenza

Read More

Details

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Department Type
VETERINARY SCIENCES

Organization Type
SCHOOLS OF VETERINARY MEDICINE

State Code
IN

Congressional District
04

Other Information

FOA
PAR-20-178

Study Section
Special Emphasis Panel[ZAI1 JHM-X (S3)]

Fiscal Year
2020

Award Notice Date
11-August-2020

Administering Institutes or Centers
NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES

DUNS Number
072051394

CFDA Code
855

Project Start Date
11-August-2020

Project End Date
31-July-2025

Budget Start Date
11-August-2020

Budget End Date
31-July-2021

Project Funding Information for 2020

Total Funding
$792,476

Direct Costs
$660,247

Indirect Costs
$132,229

Year	Funding IC	
2020	NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES	$792,476

NIH Categorical Spending

Click here for more information on NIH Categorical Spending

Funding IC

Thank you for your feedback!

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

Sub Projects

No Sub Projects information available for 1R01AI158177-01

Publications

No Publications available for 1R01AI158177-01

Patents

No Patents information available for 1R01AI158177-01

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 1R01AI158177-01

Clinical Studies

No Clinical Studies information available for 1R01AI158177-01

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Related News Releases

No news release information available for 1R01AI158177-01

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Similar Projects

No Similar Projects information available for 1R01AI158177-01