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Back to Search Results

Description
Details
Sub-Projects
Publications
Patents
Outcomes
Clinical Studies
News and More
History
Similar Projects

A nanobody-based vaccine strategy to combat CoVID-19

Project Number	Former Number	Contact PI/Project Leader	Awardee Organization
3DP1AI150593-02S1	1DP1AI150593-01	PLOEGH, HIDDE L	BOSTON CHILDREN'S HOSPITAL

Description

Abstract Text

Summary The development of a **vaccine** that protects against SARS-CoV-2, the coronavirus responsible for the current pandemic (**COVID**-19), is urgently needed. We have developed camelid-derived antibody fragments – nanobodies – that target surface proteins on mouse and human antigen presenting cells. These targets include class II MHC products and the integrin alpha M (CD11b). By attaching to these nanobodies various antigens in the form of proteins or peptides, we can elicit stronger B and T cell responses against the attached payloads when compared to the corresponding 'free' antigens. In particular, adducts composed of the anti-CD11b nanobody with peptides of viral origin induced a protective cytotoxic CD8 T cell response in a human papillomavirus model and inspire confidence that a similar outcome may be accomplished for SARS-CoV-2. We propose to apply these strategies to generate strong adaptive immune responses against SARS-CoV-2 antigens. The anti-mouse and anti-human class II MHC-specific nanobodies recognize all allotypes and will be used to target antigens to mouse and human class II MHC products in normal and HLA-DR4 transgenic mice. CD4 T cell and antibody responses will be analyzed in these studies. Adducts composed of the CD11b nanobody and **COVID**-19 antigenic peptides will be used to elicit CD8 T cell responses in normal and HLA-A2 transgenic mice. For the most immunogenic SARS-CoV-2 antigens, we shall identify the minimal peptides recognized for possible inclusion in future **vaccine** preparations.

Public Health Relevance Statement

Narrative We propose to enhance immunogenicity to SARS-CoV-2 (the virus that causes COVID-19) through direct targeting to antigen presenting cells via specific antibody fragments (nanobodies). This will elicit CD4, CD8, and B cell responses against SARS-CoV-2 structural elements using purely protein-based, non-replicating vaccine preparations. Our strategy complements passive immunization efforts and vaccination strategies that rely on vector-based or non-targeted approaches.

NIH Spending Category

Biotechnology Coronaviruses Emerging Infectious Diseases Immunization Immunotherapy Infectious Diseases Prevention Vaccine Related

Project Terms

2019-nCoV Antibodies Antibody Formation Antibody Response Antibody titer measurement Antigen Targeting Antigen-Presenting Cells Antigens B-Lymphocytes CD11b Antigens CD4 Positive T Lymphocytes

Thank you for your feedback!

CD8-Positive T-Lymphocytes COVID-19 Chloroquine Complement Coronavirus Disease Outbreaks Ebola Elements Epitopes Formulation Future Generations Genetic Genome HIV HLA-A2 Antigen HLA-DR4 Antigen Human Human Papillomavirus Human papillomavirus 16

Read More

Details

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Not Applicable

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Organization

Name
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BOSTON

Country
UNITED STATES (US)

Department Type
Unavailable

Organization Type
Independent Hospitals

State Code
MA

Congressional District
07

Other Information

FOA
PA-20-135

Study Section
Special Emphasis Panel[ZRG1(50)-R]

Award Notice Date
23-July-2020

Fiscal Year
2020

Administering Institutes or Centers
NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES

DUNS Number
076593722

CFDA Code
855

Project Start Date
01-August-2020

Project End Date
31-July-2021

Budget Start Date
01-August-2020

Budget End Date
31-July-2021

Project Funding Information for 2020

Total Funding
$442,500

Direct Costs
$250,000

Indirect Costs
$192,500

Year	Funding IC	
2020	NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES	$442,500

NIH Categorical Spending

Click here for more information on NIH Categorical Spending

Funding IC	FY Total Cost by IC	NIH Spending Category

Thank you for your feedback!

NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES	$442,500	Biotechnology; Coronaviruses; Emerging Infectious Diseases; Immunization; Immunotherapy; Infectious Diseases; Prevention; Vaccine Related;

Sub Projects

No Sub Projects information available for 3DP1AI150593-02S1

Publications

No Publications available for 3DP1AI150593-02S1

Patents

No Patents information available for 3DP1AI150593-02S1

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 3DP1AI150593-02S1

Clinical Studies

No Clinical Studies information available for 3DP1AI150593-02S1

News and More

Related News Releases

No news release information available for 3DP1AI150593-02S1

Thank you for your feedback!

History

No Historical information available for 3DP1AI150593-02S1

Similar Projects

No Similar Projects information available for 3DP1AI150593-02S1

Thank you for your feedback!