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P01AI202802

Project Grant

Overview Status Timeline Subs History Additional

Overview

List Text

Grant Description

Immune mechanisms shaping airborne influenza transmission - P01 overall — Immune mechanisms shaping airborne influenza transmission project summary.

Influenza viruses are among the most efficiently transmitted respiratory pathogens, posing continual threats to global health and security.

Although annual vaccination reduces disease burden, influenza persists due to rapid viral evolution and the limited capacity of current vaccines to fully prevent infection and transmission.

Airborne spread is the dominant route, yet we lack a mechanistic understanding of how host immunity and environmental conditions together govern the transmission process, from virus shedding by infected donors, through aerosol transport and decay, to infection of susceptible recipients.

This gap limits the development of vaccines and interventions that can prevent both disease and spread.

To address this challenge, we propose an integrated P01 program combining swine and human studies with multiscale computational modeling.

Our central hypothesis is that pre-existing immunity, mediated by antibodies and T cells, and environmental conditions, defined by temperature and relative humidity (T/RH), are the two major determinants governing airborne influenza transmission.

Each factor influences distinct but interconnected stages: immune status dictates the magnitude of virus shedding in infected donors and the susceptibility of recipients, whereas T/RH determines the stability and persistence of virus-laden aerosols during transport.

Project 1 will define how pre-existing immunity, arising from infection or vaccination, and T/RH conditions interact to influence transmission efficiency.

It will focus on antibody (Ab)-mediated mechanisms, both systemic and mucosal, that limit viral shedding, aerosol infectivity, and recipient susceptibility, and will extend these findings to human cohorts to establish translational Ab-mediated immune correlates of protection.

Project 2 will, in parallel, define cellular immune mechanisms by which CD4, CD8, and γδ T cells regulate Ab development and viral control, shedding, and mucosal protection against airborne transmission, as well as translational T cell-mediated correlates of protection.

Together, the two projects will link immune responses and environmental influences to explain the continuum of airborne transmission.

Three integrated cores will ensure rigor and synergy: Core A (administrative) coordinates program management and oversight; Core B (resource development) maintains and distributes wild-type and genetically engineered swine models; and Core C (integrative modeling and data analysis) synthesizes immunological, virological, and environmental datasets through mechanistic and stochastic modeling to connect immune and physical processes with transmission outcomes.

Collectively, this program will deliver a comprehensive framework linking donor immunity, aerosol physics, and recipient susceptibility in airborne influenza transmission.

The resulting data, models, and swine resources will accelerate the development of next-generation vaccines and interventions that prevent disease and block transmission, advancing control strategies for influenza as well as other respiratory pathogens.

Awardee	University Of Missouri System
Funding Goals	<P STYLE="MARGIN-LEFT:0IN;">TO ASSIST PUBLIC AND PRIVATE NONPROFIT INSTITUTIONS AND INDIVIDUALS TO ESTABLISH, EXPAND AND IMPROVE BIOMEDICAL RESEARCH AND RESEARCH TRAINING IN INFECTIOUS DISEASES AND RELATED AREAS; TO CONDUCT DEVELOPMENTAL RESEARCH, TO PRODUCE AND TEST RESEARCH MATERIALS. TO ASSIST PUBLIC, PRIVATE AND COMMERCIAL INSTITUTIONS TO CONDUCT DEVELOPMENTAL RESEARCH, TO PRODUCE AND TEST RESEARCH MATERIALS, TO PROVIDE RESEARCH SERVICES AS REQUIRED BY THE AGENCY FOR PROGRAMS IN INFECTIOUS DISEASES, AND CONTROLLING DISEASE CAUSED BY INFECTIOUS OR PARASITIC AGENTS, ALLERGIC AND IMMUNOLOGIC DISEASES AND RELATED AREAS. PROJECTS RANGE FROM STUDIES OF MICROBIAL PHYSIOLOGY AND ANTIGENIC STRUCTURE TO COLLABORATIVE TRIALS OF EXPERIMENTAL DRUGS AND VACCINES, MECHANISMS OF RESISTANCE TO ANTIBIOTICS AS WELL AS RESEARCH DEALING WITH EPIDEMIOLOGICAL OBSERVATIONS IN HOSPITALIZED PATIENTS OR COMMUNITY POPULATIONS AND PROGRESS IN ALLERGIC AND IMMUNOLOGIC DISEASES. BECAUSE OF THIS DUAL FOCUS, THE PROGRAM ENCOMPASSES BOTH BASIC RESEARCH AND CLINICAL RESEARCH. </P>
Grant Program (CFDA)	93.855 - Allergy and Infectious Diseases Research
Awarding / Funding Agency	National Institute of Allergy and Infectious Diseases (NIAID) [HHS - NIH]
Place of Performance	Missouri United States
Geographic Scope	State-Wide
Related Opportunity	Influenza Transmission Research Consortium (P01 Clinical Trial Optional) (RFA-AI-25-035)

Status (Ongoing)

Period of Performance

9/1/26	7/31/31
Start Date	End Date

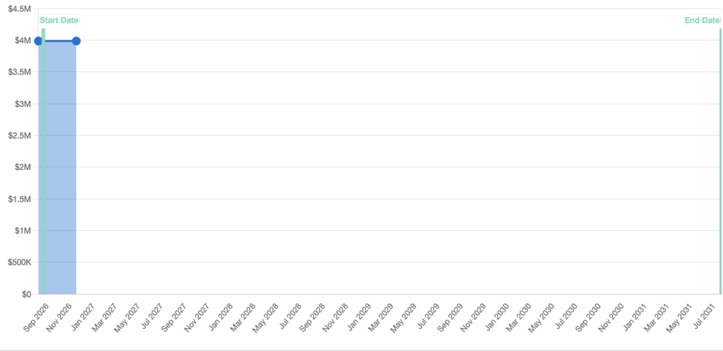
5.0% Complete

Funding Split

$4.0M	$0.0	$4.0M
Federal Obligation	Non-Federal Obligation	Total Obligated

100.0% Federal Funding

Activity Timeline



Additional Detail

Award ID FAIN	P01AI202802
SAI Number	P01AI202802-1931432298
Award ID URI	SAI UNAVAILABLE
Awardee Classifications	Public/State Controlled Institution Of Higher Education
Awarding Office	75NM00 NIH National Institute of Allergy and Infectious Diseases
Funding Office	75NM00 NIH National Institute of Allergy and Infectious Diseases
Awardee UEI	SZPJL5ZRCLF4
Awardee CAGE	9C156
Performance District	MO-90
Senators	Joshua Hawley Eric Schmitt

Modified: 9/4/26

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