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Inter-regional study of transmission, adaptation and pathogenesis of viruses with pandemic potential in Southeast Asia and West/Central Africa

Project Number
1U01AI151758-01

Contact PI/Project Leader
SAKUNTABHAI, ANAVAJ

Awardee Organization
INSTITUT PASTEUR

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Description

Abstract Text

Project Summary/Abstract We will establish an Emerging Infectious Disease Research Center in Southeast Asia and West/Central Africa with an inter-continental one health approach designed to improve the capacity to respond rapidly and effectively to outbreaks. Our proposal is built on an existing network of laboratories/epidemiologists in close contact with national healthcare systems. We will identify factors influencing emergence and transmission at the virus, vector and reservoir level, leading to epidemics in suspected spillover conditions. We will focus on high priority RNA viruses with epidemic potential in Africa (Rift Valley Fever virus (RVFV), Crimean Congo Hemorrhagic Fever Virus (**CCHFV**)) and in Southeast Asia (dengue virus (DENV)) as well as viruses (Disease X) identified from symptomatic surveillance or insect sampling. We will tackle problems in emerging infectious diseases by the following specific aims: 1) Enhance surveillance and detect unknown RNA viruses with potential for spillover to humans. We will implement an autonomous solar-powered mobile suitcase laboratory for rapid pathogen identification in the field. Connection to a cloud computing system will facilitate data analysis and sharing among healthcare centers and laboratories. We will survey pathogens present in insects in different ecological settings. We will develop new diagnostic tools for these viruses and conduct prevalence and behavioral studies in human populations to determine risk factors. 2) Understand transmission dynamics of endemic RNA viruses with high risk of outbreak. We will focus on RVFV and **CCHFV** in Senegal and Cameroun, and DENV in Cambodia. We will perform surveys in animals and humans using a more specific multiplex assay. We aim at obtaining better knowledge on prevalence, transmission dynamics, and identifying major insect vectors and animal reservoirs. 3) Understand factors influencing adaptation of RNA viruses to new hosts. We will use state of the art technology to generate and study key candidate viral mutations using cells from relevant species including humans. We will study efficacy of these viruses in infection of various strains of insects to estimate transmission risks. This aim will lead to better understanding of the adaptation of these viruses to new hosts and will help design more detection methods. Lastly, 4) Study of host adaptive immune responses to emerging infectious diseases in South-East Asia and Africa. We will increase our insight into the adaptive immune response at a single cell level and the sequence-function relationship of human antibodies generated during infectious diseases (DENV, RVFV, **CCHFV**) by combining sequencing at a single cell level with antibody repertoire analysis. We will study function and characterize structure at a single antibody level. We will provide novel understanding of the role of cellular immunity in DENV disease. The proposed activity will allow the implementation of infrastructure and an analysis pipeline for outbreak preparedness in areas where viruses with potential pandemic threats circulate.

Public Health Relevance Statement

Project Narrative In recent years, there have been several outbreaks, such as Ebola and Zika, that have struck the world. We will set up research infrastructure and pipeline in countries where further outbreaks are likely to occur to study how viruses from animals and/or insects could adapt themselves to infect humans and cause outbreaks. The study will help us to better prepare to prevent and to react faster and more efficiently to the future outbreaks.

NIH Spending Category

Biodefense Biotechnology Clinical Research Emerging Infectious Diseases Genetics Immunization Infectious Diseases Prevention Rare Diseases Vector-Borne Diseases

Project Terms

Africa Animals Antibodies Antibody Repertoire Area Arthropods Biological Biological Assay CD4 Positive T Lymphocytes Cambodia Cells Cellular Immunity Central Africa Cloud Computing Collection Communicable Diseases Computer Systems Country Crimean-Congo Hemorrhagic Fever Virus Data Analyses Dengue Virus Detection Diagnosis Diagnostic Diagnostic Reagent Disease Disease Outbreaks Ebola Emerging Communicable Diseases Encephalitis Endemic Diseases Environment Epidemic Epidemiologist Flavivirus Future Genome Goals Health Healthcare Healthcare Systems Human Immune response Immunologic Receptors Infection

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Project Number
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Contact PI/Project Leader
SAKUNTABHAI, ANAVAJ

Title
PROFESSOR

Contact
anavaj.sakuntabhai@pasteur.fr

Awardee Organization
INSTITUT PASTEUR

Contact
jean.patterson@nih.gov

Organization

Name
INSTITUT PASTEUR

City
PARIS

Country
FRANCE (FR)

Department Type
Unavailable

Organization Type
Unavailable

State Code

Congressional District

Other Information

FOA
RFA-AI-19-028

Study Section
Special Emphasis Panel[ZAI1 EC-M (J2)]

Fiscal Year
2020

Award Notice Date
17-July-2020

Administering Institutes or Centers
NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES

DUNS Number
278151154

CFDA Code
855

Project Start Date **17-July-2020**

Project End Date **31-May-2025**

Budget Start Date **17-July-2020**

Budget End Date **31-May-2021**

Project Funding Information for 2020

Total Funding
$1,186,205

Direct Costs
$1,142,061

Indirect Costs
$44,144

Year	Funding IC	FY Total Cost by IC
2020	NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES	$1,186,205

NIH Categorical Spending

Click here for more information on NIH Categorical Spending

Funding IC	FY Total Cost by IC	NIH Spending Category
NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES	$1,186,205	Biodefense; Biotechnology; Clinical Research; Emerging Infectious Diseases; Genetics; Immunization; Infectious Diseases; Prevention; Rare Diseases; Vector-Borne Diseases;

Sub Projects

No Sub Projects information available for 1U01AI151758-01

Publications

No Publications available for 1U01AI151758-01

Patents

No Patents information available for 1U01AI151758-01

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No Clinical Studies information available for 1U01AI151758-01

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No news release information available for 1U01AI151758-01

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No Historical information available for 1U01AI151758-01

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