Antiviral Drug Discovery (AViDD) Centers for Pathogens of Pandemic Concern

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Antiviral Program for Pandemics (APP)

$3.2B

5-year, $3.2B USG-funded program allocated across 7 virus families of pandemic potential – largest investment supporting pre-pandemic therapeutic development to date

Program objective: accelerate development of direct-acting antivirals from discovery to early development, as a complement to vaccines, neutralizing antibodies, and other therapeutic options

In-kind support and funding opportunities provided by NIAID, NCATS, and BARDA including new Antiviral Drug Discovery (AViDD) Centers and public-private partnerships

United States Government (USG), National Institute of Allergy and Infectious Diseases (NIAID), National Center for Advancing Translational Sciences (NCATS), Biomedical Advanced Research and Development Authority (BARDA)

Antiviral Program for Pandemics (APP)

NIAID Support for New Antivirals Targeting Pandemic Viruses

----- In-kind support —— Direct funding

In Vitro Testing Against Priority Viruses

Animal Models, Efficacy

Medicinal Chem. Scale-up, Process Dev

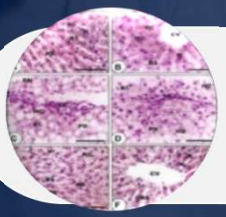
Scope :

Direct-acting antivirals

Novel small-molecules
Small biotherapeutics

Activity against RNA Viruses with Pandemic Potential

Home-based administration (oral, inhaled)



PK, ADME, Toxicology

Ph1 Clinical Trial

Annual BAA Contracts (LO to Ph2)

Email: APPSubmission@mail.nih.gov **Website:** https://niaid.nih.gov/research/antivirals

Two-pronged Approach Catalyzes Development of a Robust Antivirals Pipeline

Discovery

Build a sustainable platform to discover new antivirals by:

- Establishing multi-investigator, and multi-disciplinary discovery groups (AViDD Centers)
- Using structural and systems methods to identify potential drug targets shared across key viral pathogens
- Progressing promising candidates to IND[1]-enabling work

Development

Accelerate clinical testing of promising antiviral candidates by:

- Supporting key non-clinical and early clinical studies
- Establishing public-private partnerships to supplement private sector capabilities (including facilitating third-party collaborations)
- De-risking candidates for further late-stage development

1. IND – Investigational New Drug

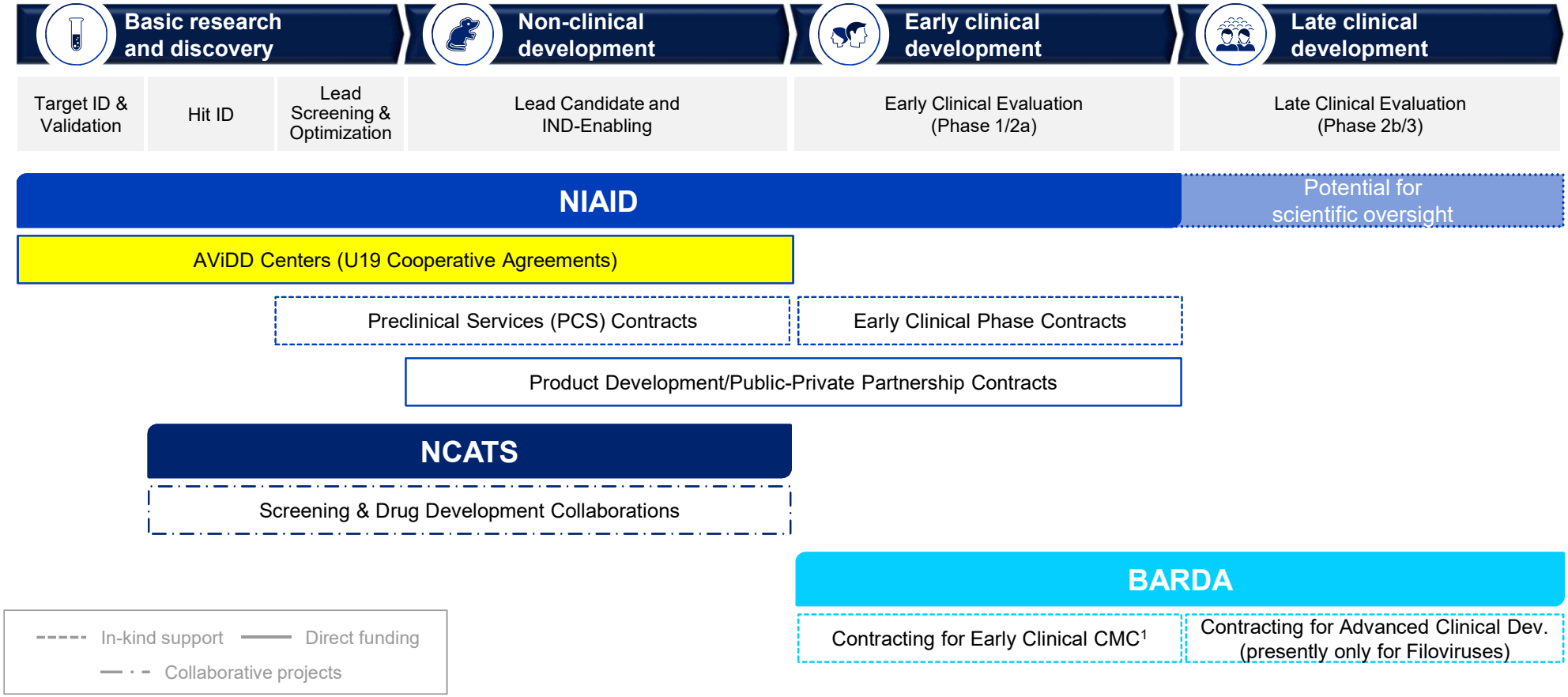
Seven Viral Families In-scope for the APP

Basic research and discovery | Non-clinical development | Early clinical development | Late clinical development

- **Coronaviridae** – MERS, SARS-CoV-2
- **Bunyavirales** – Lassa, Junin, Rift Valley Fever Virus, Andes, Sin Nombre, LaCrosse, California Encephalitis, Crimean Congo Hemorrhagic Fever
- **Filoviridae** – Ebola, Marburg
- **Flaviviridae** – Dengue, Zika, West Nile
- **Paramyxoviridae** – Nipah, Hendra
- **Picornaviridae** – EV-D68, EV-A71
- **Togaviridae** – Chikungunya, EEE, VEE, WEE

Coronaviridae
(only SARS-CoV-2)

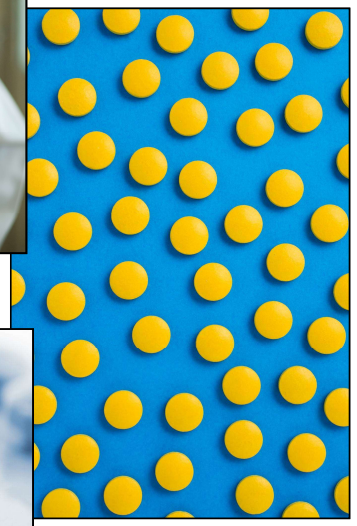
Multiple Mechanisms of Targeted Support Coordinated Across Drug Discovery-Development Pipeline



1. CMC – Chemistry and Manufacturing Controls
Note: As of 8/3/2021

Antiviral Drug Discovery Centers (AViDD)

Objective: To establish multidisciplinary Centers focused on discovery and development of antivirals against coronaviruses (CoVs) and one or more select RNA viruses with pandemic potential.



Antiviral Drug Discovery (AViDD) Centers for Pathogens of Pandemic Concern

- Pandemic highlighted the need for a more robust pipeline of diverse antiviral drugs
- AViDD centers will help fill that gap
  - Foundational research on new targets for direct-acting antivirals
  - Lead discovery through selection of clinical candidates
  - Industry involvement key to rapid advancement of leads
- Urgent need for demonstrated progress
  - 3 years funding up front to accelerate delivery
  - Funding for years 4-5 dependent on future allocation from HHS

AViDD Centers

Approach: Fund integrated, multidisciplinary Centers with innovative virology, biochemistry, structural biology, medicinal chemistry, genomics and/or systems biology capabilities

Industry: Centers include industry participation for expertise with optimization of novel antiviral lead series

Scope: Aligned with APP - small molecules and non-antibody biotherapeutics that directly block viral targets in SARS-CoV-2 and other RNA viruses of pandemic potential

Program budget: $1B over 5 years planned (3 years secured)

Antiviral Drug Discovery (AViDD) Centers for Pathogens of Pandemic Concern

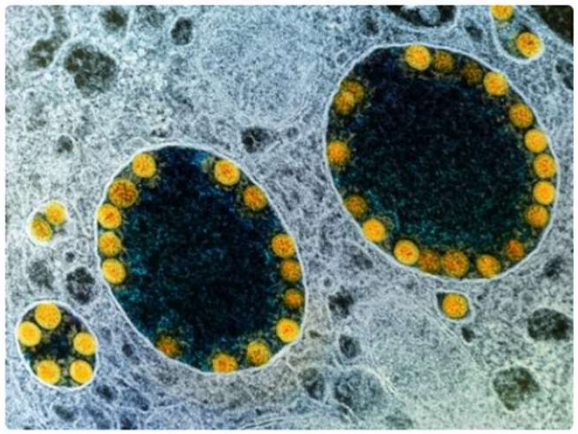
News & Events › Newsroom › News Releases

NIAID Announces Antiviral Drug Development Awards

May 18, 2022

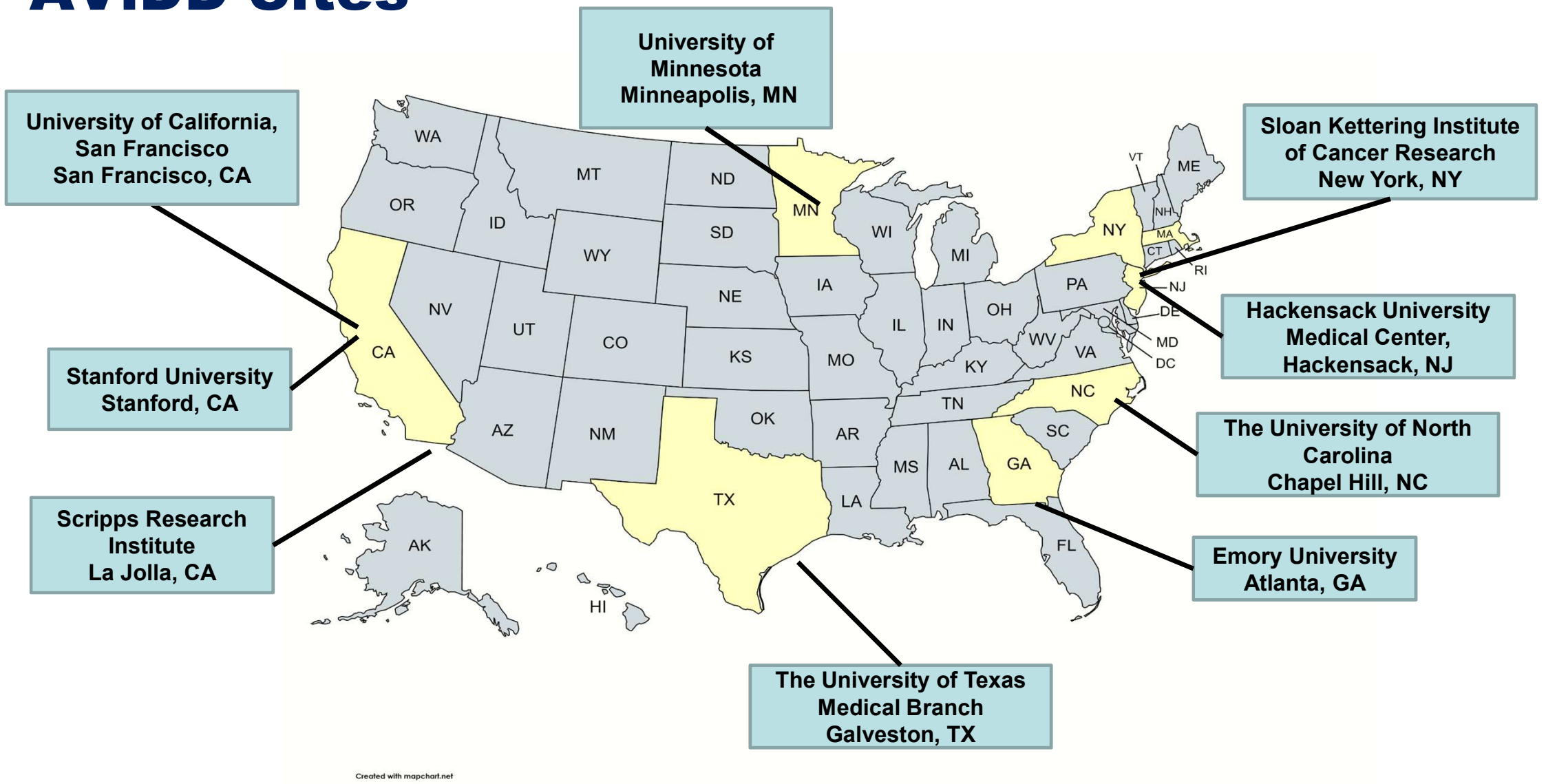
The National Institute of Allergy and Infectious Diseases (NIAID), part of the National Institutes of Health, has awarded approximately $577 million to establish nine Antiviral Drug Discovery (AViDD) Centers for Pathogens of Pandemic Concern.

The AViDD centers will conduct innovative, multidisciplinary research to develop candidate COVID-19 antivirals, especially those that can be taken in an outpatient setting, as well as antivirals targeting specific viral families with high potential to cause a pandemic in the future. These include paramyxoviruses, bunyaviruses, togaviruses, filoviruses (including Ebola viruses and Marburg virus), picornaviruses (including enteroviruses and other cold-



Transmission electron micrograph of SARS-CoV-2 virus particles (yellow) within endosomes of a heavily infected nasal Olfactory Epithelial Cell.

AViDD Sites


University of Minnesota
Minneapolis, MN
University of California, San Francisco
San Francisco, CA
Sloan Kettering Institute of Cancer Research
New York, NY
Hackensack University Medical Center,
Hackensack, NJ
Stanford University
Stanford, CA
The University of North Carolina
Chapel Hill, NC
Scripps Research Institute
La Jolla, CA
Emory University
Atlanta, GA
The University of Texas Medical Branch
Galveston, TX
WA
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AViDD Centers

AI-Driven Structure-Enabled Antiviral Platform (ASAP)
PIs: John Chodera, Ph.D.; Benjamin Perry, Ph.D.; Alpha Lee, Ph.D.

Antiviral Countermeasures Development Center (AC/DC)
PIs: George Painter, Ph.D.; Richard Plemper, Ph.D.

Center for Antiviral Medicines & Pandemic Preparedness (CAMPP)
PIs: Sumit Chanda, Ph.D.; Arnab Chatterjee, Ph.D; Adolfo García-Sastre, Ph.D.

Development of Outpatient Antiviral Cocktails Against SARS-CoV-2 and other Potential Pandemic RNA Viruses
PI: Jeffrey Glenn, M.D., Ph.D.

Metropolitan AntiViral Drug Accelerator
PIs: David Perlin, Ph.D.; Charles Rice, Ph.D.

Midwest AViDD Center
PIs: Reuben Harris, Ph.D.; Fang Li, Ph.D.

QCRG Pandemic Response Program
PI: Nevan Krogan, Ph.D.

Rapidly Emerging Antiviral Drug Development Initiative – AViDD Center (READDI-AC)
PIs: Ralph Baric, Ph.D.; Timothy Willson, Ph.D.

UTMB-Novartis Alliance for Pandemic Preparedness
PIs: Pei-Yong Shi, Ph.D.; Thierry Diagana, Ph.D.