

# Pandemic Preparedness: The Biomedical Research Approach

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## Pandemic Preparedness: The Biomedical Research Approach

- Basic research portfolio
- Research Capacity – domestic and international
- Countermeasure development

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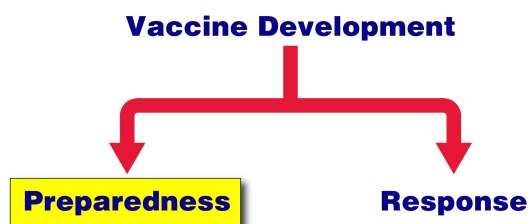
## Vaccinology and Emerging Infectious Diseases



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## Vaccine Development for Pandemic Preparedness

- Priority-Pathogen Approach
- Platform Approach
- Prototype-Pathogen Approach

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## Vaccine Development for Pandemic Preparedness

### ■ Priority-Pathogen Approach

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## WHO R&D Blueprint: Priority Diseases, 2021

Ebola virus disease  
and Marburg virus  
disease

Lassa fever

Crimean-Congo  
haemorrhagic fever  
(CCHF)Nipah and henipaviral  
diseasesRift Valley fever  
(RVF)

Zika

Middle East respiratory  
syndrome coronavirus  
(MERS-CoV) and severe  
acute respiratory  
syndrome (SARS)

Disease X

COVID-19

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Source: WHO

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## Coalition for Epidemic Preparedness Innovations (CEPI) Priority Diseases

CEPI

- COVID-19
- Lassa fever
- Middle East Respiratory Syndrome (MERS)
- Nipah
- Ebola
- Rift Valley fever
- Chikungunya

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Source: [https://cepi.net/research\\_dev/priority-diseases/](https://cepi.net/research_dev/priority-diseases/)

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## Vaccine Development for Pandemic Preparedness

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## Vaccine Platform Technologies

Genetic immunization  
(DNA and RNA vaccines)  
SARS, MERS, West Nile,  
Zika, RSVNanoparticles  
(viral protein on particle)  
Influenza, Malaria, RSVViral vector  
(e.g., VSV, adenovirus)  
Ebola, Marburg, ZikaVirus-like particle (VLP)  
(no RNA or DNA;  
non-infectious)  
Chikungunya, Zika,  
WEVEERecombinant protein  
Influenza, RSVAdjuvants  
(e.g., AS01, MF59)

Selected Examples

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## Vaccine Development for Pandemic Preparedness

### ■ Priority-Pathogen Approach

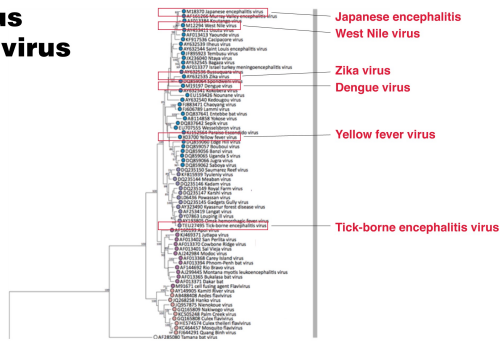
### ■ Platform Approach

### ■ Prototype-Pathogen Approach

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## Genus Flavivirus



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## Prototype Pathogen Approach To Vaccine Development



**Build on Prior Experiences**

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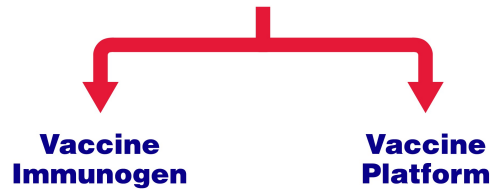
## Applying Strategies and Tools from One Virus to Inform Vaccine Design for Related Viruses

- Basic virology (e.g., neutralization mechanisms)
- Assays for preclinical and clinical settings
- Animal models
- Antigenic targets
- Optimal platforms
- Potential immune correlates
- Manufacturing strategies

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## Vaccine Construct



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# Therapeutics

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HHS.gov U.S. Department of Health & Human Services

FOR IMMEDIATE RELEASE  
June 17, 2021

**Biden Administration to Invest  
\$3.2 Billion from American Rescue  
Plan as Part of COVID-19 Antiviral  
Development Strategy**

*Whole-of-Government Effort Will Develop Next  
Generation of COVID-19 Treatments, Better  
Prepare U.S. to Respond to Future Virus Threats*

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**The Antiviral Program for Pandemics (APP)** aims to catalyze the development of new medicines to combat COVID-19 and prepare for other pandemic threats

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## Few Treatments Exist for Many Viruses with Pandemic Potential



**Coronaviridae**  
e.g., SARS, MERS



**Bunyaviridae**  
e.g., Hemorrhagic fevers, Hantavirus, Lassa fever



**Filoviridae**  
e.g., Ebola, Marburg



**Flaviviridae**  
e.g., West Nile, Dengue



**Paramyxoviridae**  
e.g., Nipah, RSV



**Picornaviridae**  
e.g., Enterovirus D68



**Togaviridae**  
e.g., Chikungunya

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## APP Will Utilize a Two-Pronged Approach for New Medicines Against Viruses of Pandemic Potential



### Development

- Accelerate clinical testing of promising antiviral medicines



### Discovery

- Expand basic science knowledge and discover new antiviral medicines

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## Next Steps

- Continue engagement with manufacturers to accelerate testing and authorization of promising antiviral medicines in late-stage development
- Continue to identify and evaluate additional drug candidates for program support
- Support academic-industry partnerships aimed at discovering new molecules

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## White House Releases \$65 Billion Pandemic Preparedness Proposal

By Jon Cohen

- An ambitious new plan from the White House that has a \$65.3 billion price tag and an Apollo program design would transform the way the United States responds to pandemics in part by vastly accelerating vaccine development, testing, and production.

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## Five Pillars of the White House Pandemic Preparedness Plan

- **Transforming our Medical Defenses**, including dramatically improving vaccines, therapeutics, and diagnostics.
- **Ensuring Situational Awareness** about infectious-disease threats, for both early warning and real-time monitoring.
- **Strengthening Public Health Systems**, both in the U.S. and internationally to be able to respond to emergencies, with a particular focus on protecting the most vulnerable communities.
- **Building Core Capabilities**, including personal protective equipment, stockpiles and supply chains, biosafety and biosecurity, and regulatory improvement.
- **Managing the Mission**, with the seriousness of purpose, commitment, and accountability of the Apollo Program.

AS Fauci/NIAID Source: <https://www.whitehouse.gov/wp-content/uploads/2021/09/American-Pandemic-Preparedness-Transforming-Our-Capabilities-Final-For-Web.pdf>

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