COVID-19 Conversations

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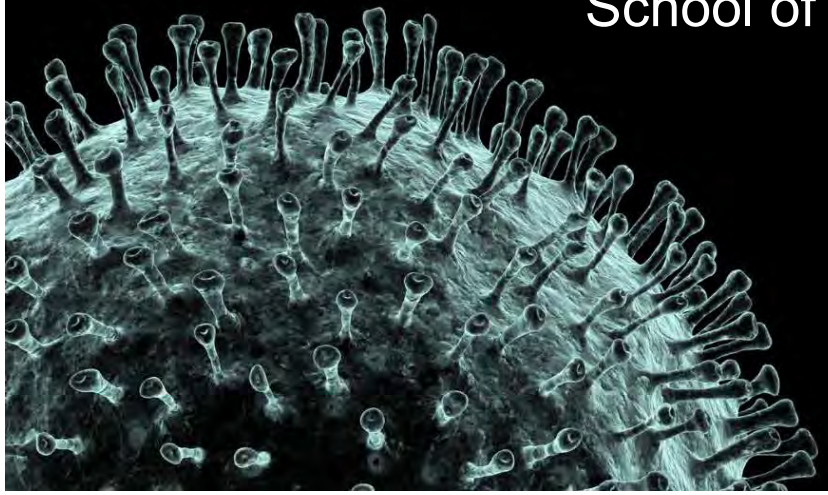


COVID19Conversations.org
#COVID19Conversations

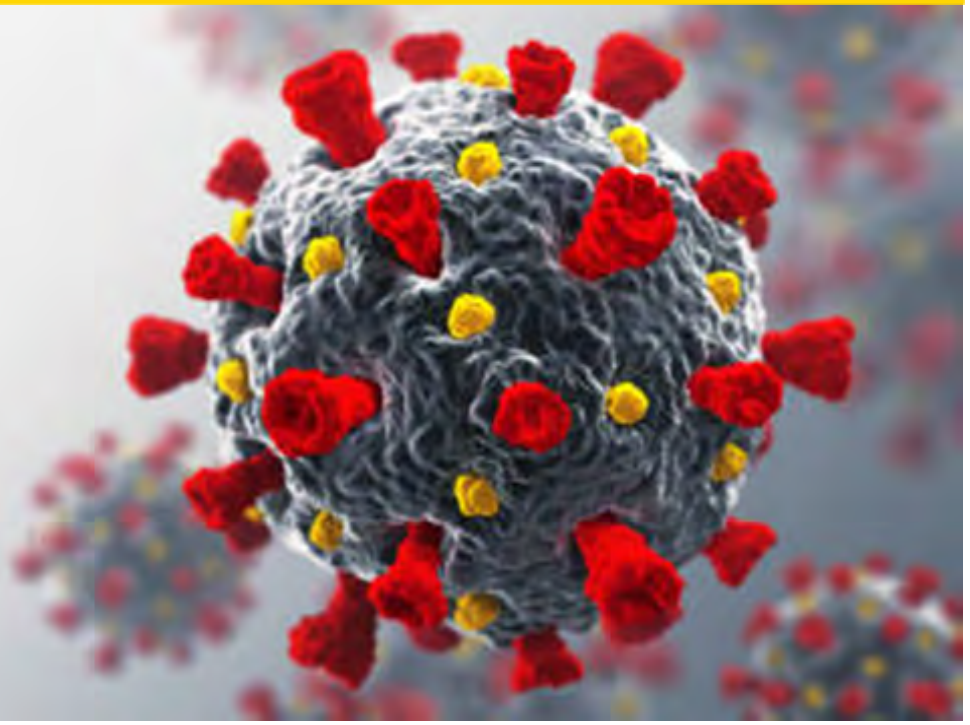
APHA
AMERICAN PUBLIC HEALTH ASSOCIATION
For science. For action. For health.

50 years NATIONAL ACADEMY of MEDICINE

CVD·GLOBAL HEALTH

CENTER FOR VACCINE DEVELOPMENT AND GLOBAL HEALTH

COVID Vaccine Development: From Discovery to Impact



Kathleen Neuzil, MD, MPH

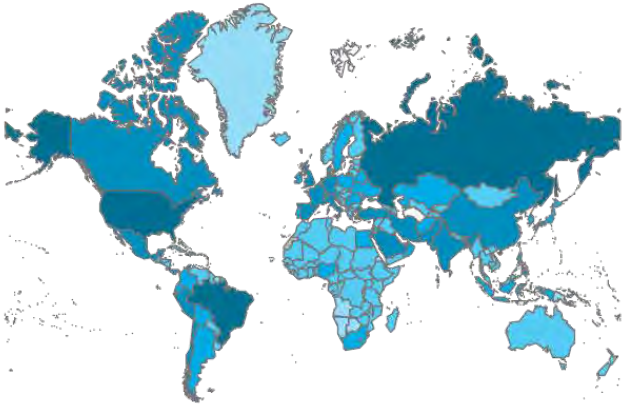
10 June 2020

UNIVERSITY of MARYLAND
SCHOOL OF MEDICINE
CENTER FOR VACCINE DEVELOPMENT
AND GLOBAL HEALTH

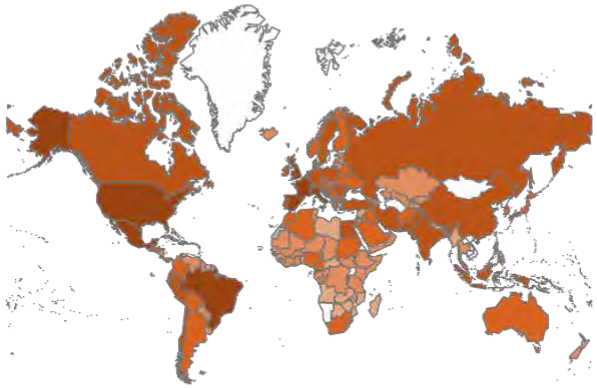
Vaccine Development: A Continuum from Discovery to Impact

Vaccines as a tool for healthy equity

The Case for a Vaccine: WHO Coronavirus Dashboard



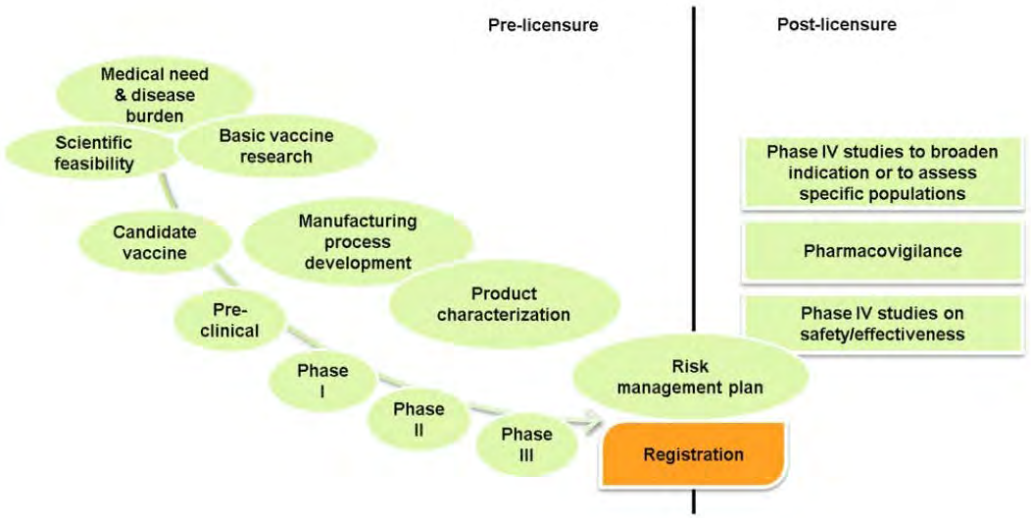
7,258,842 cases



411,694 deaths

https://covid19.who.int/

Clinical Vaccine Development: Where Do We Begin? What is the Goal?

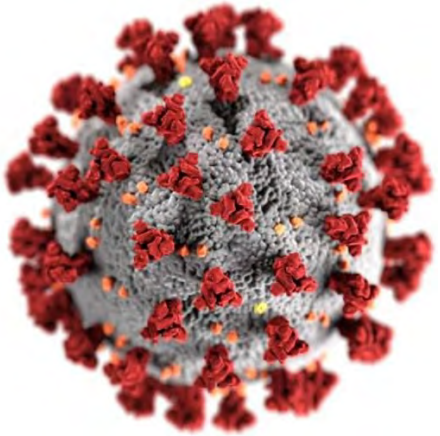


- Indication
- Target population
- Safety, reactogenicity
- Immunogenicity
- Efficacy
- Co-administration
- Duration of protection

http://www.mdpi.com/2076-393X/1/3/204/htm

What Do We Know About Immunity in Humans?

- Immune response post-infection to spike protein
  - Neutralizing responses
- Level of antibody needed to prevent re-infection?
- Duration of protection from natural immunity?
- Importance of T cell immunity?
- Phase 1 human trials in SARS, MERS
  - Broadly neutralizing antibodies



Science PERSPECTIVES

Cite as: B. S. Graham *et al.*, *Science* 10.1126/science.abb8923 (2020).

Rapid COVID-19 vaccine development

By **Barney S. Graham**

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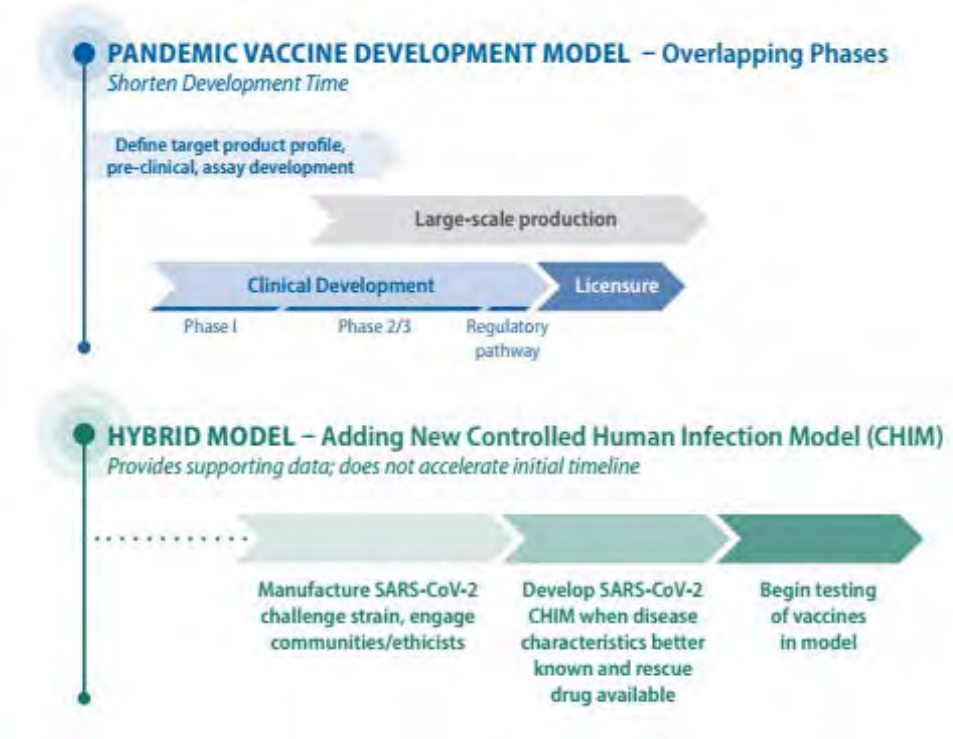
Finding the fastest pathway to vaccine availability includes the avoidance of safety pitfalls

Potential risks associated with vaccine development for COVID-19

Antibodies that bind virus without neutralizing infectivity can cause disease through increased viral replication or formation of immune complexes that deposit in tissue and activate complement pathways associated with inflammation. T helper 2 cell (T_H2)–biased responses have also been associated with ineffective vaccines that lead to enhanced disease after subsequent infection. Antibody-dependent enhancement (ADE) of viral replication has occurred in viruses with innate macrophage tropism. Virus-antibody immune complexes and T_H2-biased responses can both occur in vaccine-associated enhanced respiratory disease (VAERD).

	Antibody-mediated		T cell–mediated
	ADE	**VAERD**	**VAERD**
Mechanism	Fc-mediated increase in viral entry	Immune complex formation and complement deposition	T_H2-biased immune response
Effectors	Macrophage activation and inflammatory cytokines	Complement activation and inflammatory cytokines	Allergic inflammation and T_H2 cytokines
Mitigation	Conformationally correct antigens and high-quality neutralizing antibody		T_H1-biasing immunization and $CD8^+$ T cells

Is There a Role for Controlled Human Infection Models?



Vaccine Development: A Continuum from Discovery to Impact

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ACCESS TO COVID-19 TOOLS (ACT) ACCELERATOR

24 April 2020

A Global Collaboration to Accelerate the Development, Production and Equitable Access to New COVID-19 diagnostics, therapeutics and vaccines

COMMITMENT and CALL TO ACTION

Our Vision and Mission

Grounded in a vision of a planet protected from human suffering and the devastating social and economic consequences of COVID-19, we, an initial group of global health actors (BMGF, CEPI, Gavi, Global Fund, UNITAID, Wellcome Trust, WHO) and private sector partners and other stakeholders, are launching a landmark, global and time-limited collaboration to accelerate the development, production and equitable global access to new COVID-19 essential health technologies.

Our Mission is not only accelerated development and availability of new COVID-19 tools – it is to accelerate equitable global access to safe, quality, effective, and affordable COVID-19 diagnostics, therapeutics and vaccines, and thus to ensure that in the fight against COVID-19, no one is left behind.

Our Commitment

1. We commit to the shared aim of equitable global access to innovative tools for COVID-19 for all.

Bill & Melinda Gates foundation

dcvmn Developing Countries Vaccine Manufacturers Network

The Global Fund

IGBA International Generic and Biosimilar Medicines Association

wellcome

CEPI

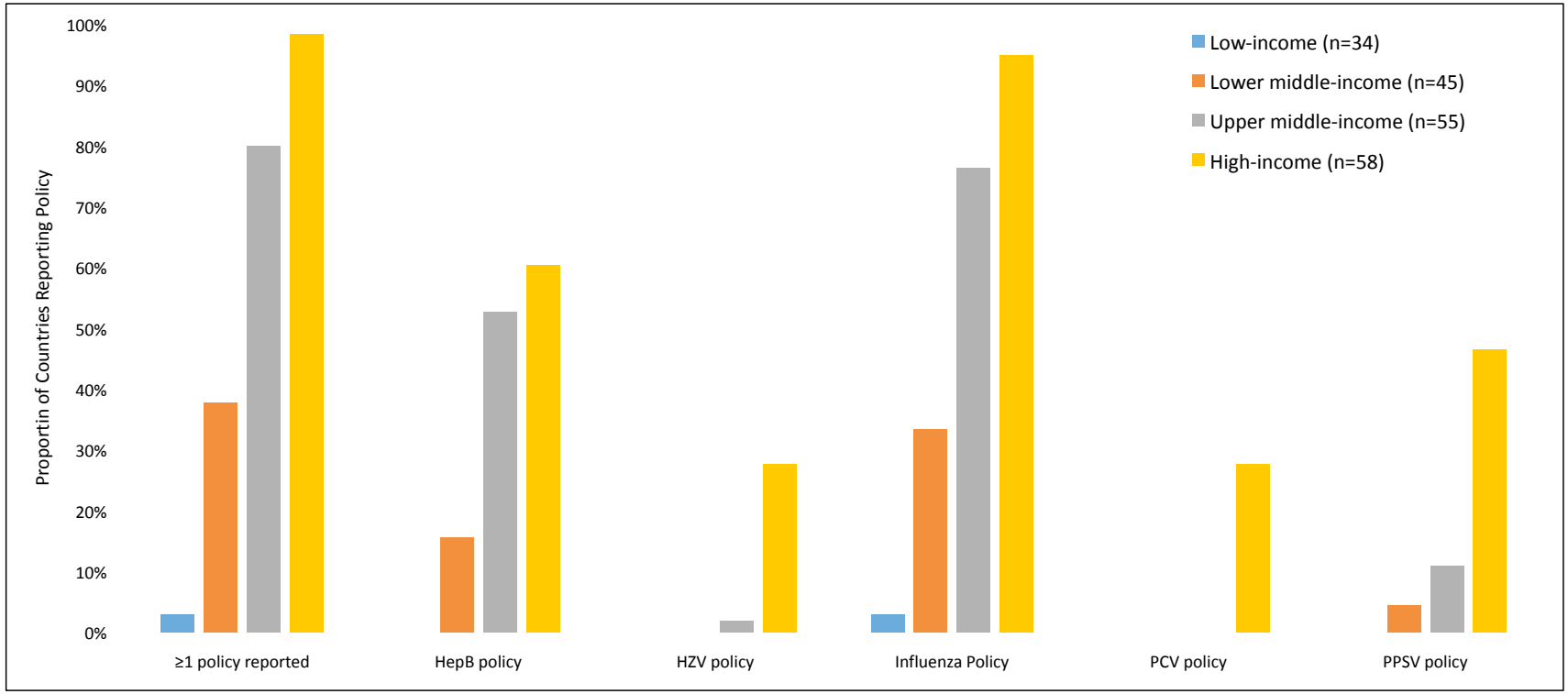
Gavi The Vaccine Alliance

IFPMA International Federation of Pharmaceutical Manufacturers & Associations

Unitaid Innovation in Global Health

World Health Organization

Reported Adult Immunization Programs by World Bank Income Category in 2018



Summary

- Safe and effective vaccines are needed for COVID-19; must be accessible, affordable and globally available
- Vaccine development is a staged, deliberate and careful process
  - Many challenges – New disease, poorly understood immunity, uncertain trajectory of outbreak
  - Vaccine safety will be meticulously assessed
  - If enhanced disease occurs it will be carefully assessed and immune mechanisms investigated