

Lessons from Rapid COVID-19 Vaccine Development

Session on Equitable Scientific Collaborations, Partnerships, and Coordination Within the US
Workshop on Applying Lessons Learned from COVID-19
Research and Development to Future Epidemics
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Barney S. Graham, MD, PhD
@BarneyGrahamMD
Consultant and Former Deputy Director
Vaccine Research Center, NIAID, NIH

Senior Advisor for Global Health Equity
Professor of Medicine and Microbiology,
Biochemistry, Immunology
Morehouse School of Medicine
Atlanta, GA

COVID-19 VACCINE & MAB DEVELOPMENT

2013-2019

2020

SARS-CoV-2 Outbreak

2013-2019

Extensive work on MERS, other CoV, and other Fusion proteins

Jan 6, 2020

Wuhan outbreak may be CoV

Jan 31, 2020

VRC makes nCoV spike protein

Feb 3, 2020

UT-Austin solves spike structure

Feb 27, 2020

Abcellera begins sorting

Apr 20, 2020

Lilly begins manufacturing

Jun 17, 2020

Phase 2 mAb555 trial begins (BLAZE-1)

Aug 3, 2020

Phase 3 mAb555 trial begins

Dec 31, 2019

1st report of respiratory virus outbreak in Wuhan, China

Jan 10, 2020

2019-nCoV sequences published

Feb 1, 2020

First nCoV spike ELISA for cross-reactivity

Feb 18, 2020

Immunogenicity confirmed in mice

Mar 16, 2020

Phase 1 Clinical vaccine trial starts

June 1, 2020

Phase 1 clinical trial for mAb555

Jul 27, 2020

Phase 3 Clinical vaccine trial starts

Sept 16, 2020

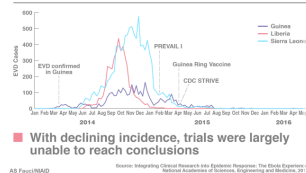
Lilly announces efficacy result in BLAZE-1

mRNA-1273 – 6.5 months to phase 3

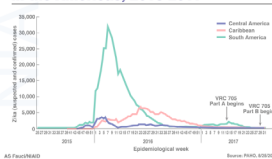
mAb555 – 5 months to phase 3



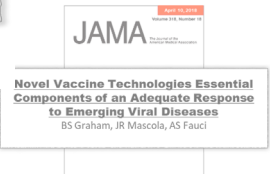
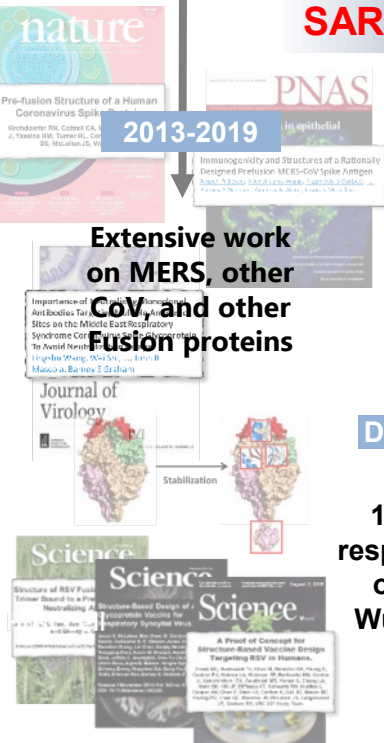
Ebola Cases and Vaccine Trial Launch Dates



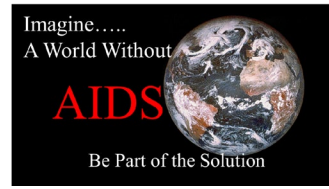
Suspected and Confirmed Zika Cases in the Americas, 2015-2017



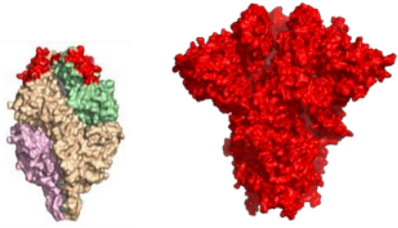
MAID



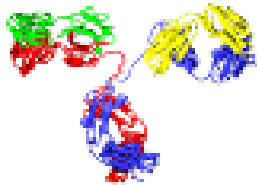
Readiness for COVID-19 and its Consequences



HIV-1 vaccine development

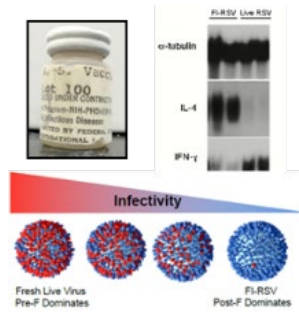


Precision vaccinology including structure-based vaccine design and protein engineering for RSV and CoV

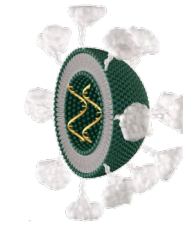


Human monoclonal antibody discovery

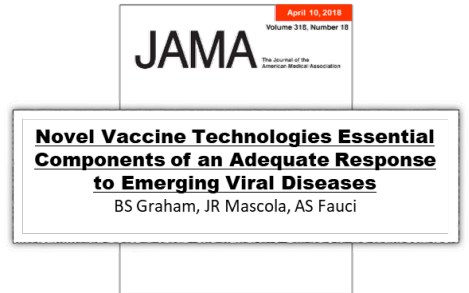
RSV vaccine-enhanced disease pathogenesis



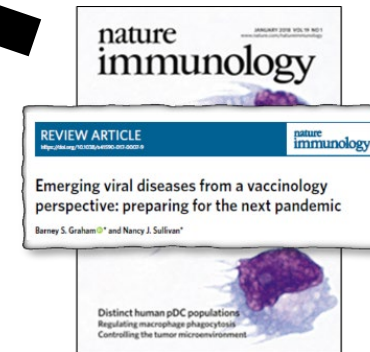
Prior responses to PHEIC and interagency coordination



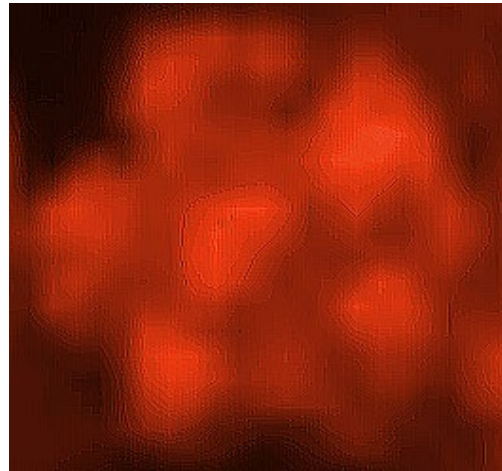
Platform manufacturing technologies – DNA, vectors



Prototype Pathogen Approach for Pandemic Preparedness and Response

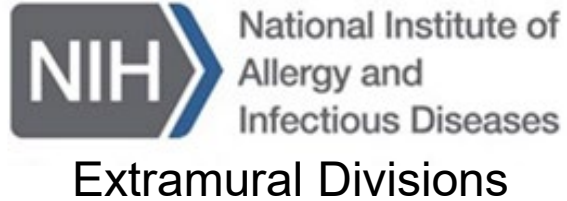


Pre-existing public-private and academic partnerships



VRC Coronavirus Collaborations

Clinical Trials Networks



Antibody
Discovery



Vaccine
Research
Center



Basic Research



Pandemic
Preparedness



基亞疫苗生物製劑股份有限公司
MEDIGEN VACCINE BIOLOGICS CO



VANDERBILT

Virus replication
& evolution

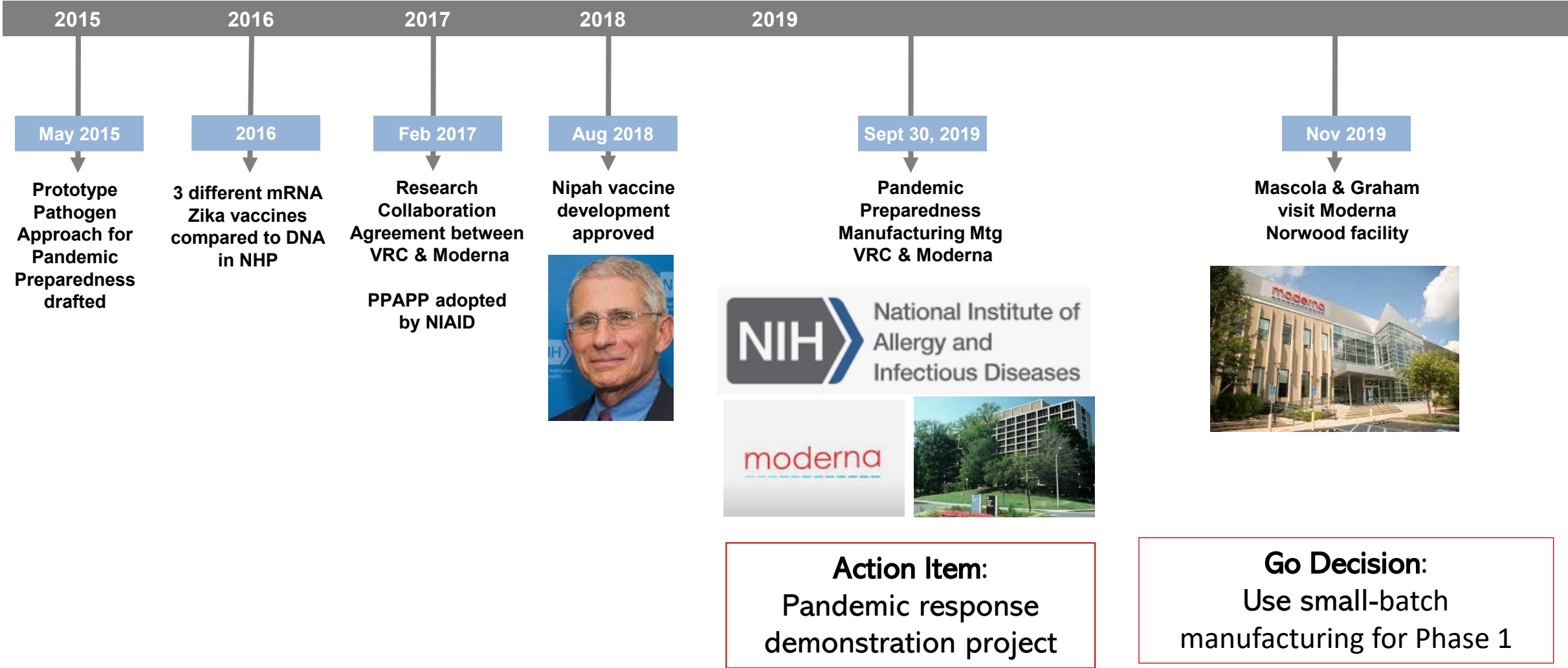


Animal models &
molecular biology



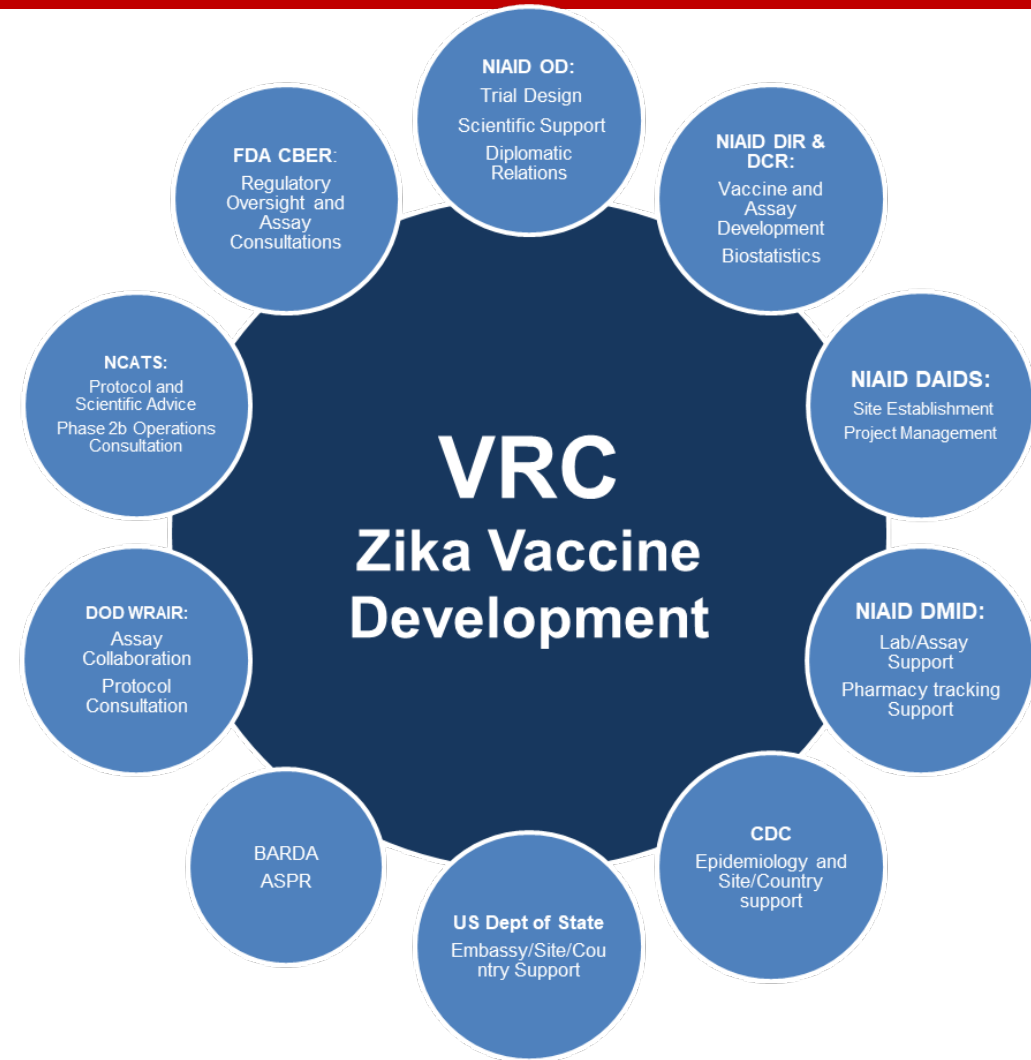
Structural Biology

Pandemic Preparedness Demonstration Project

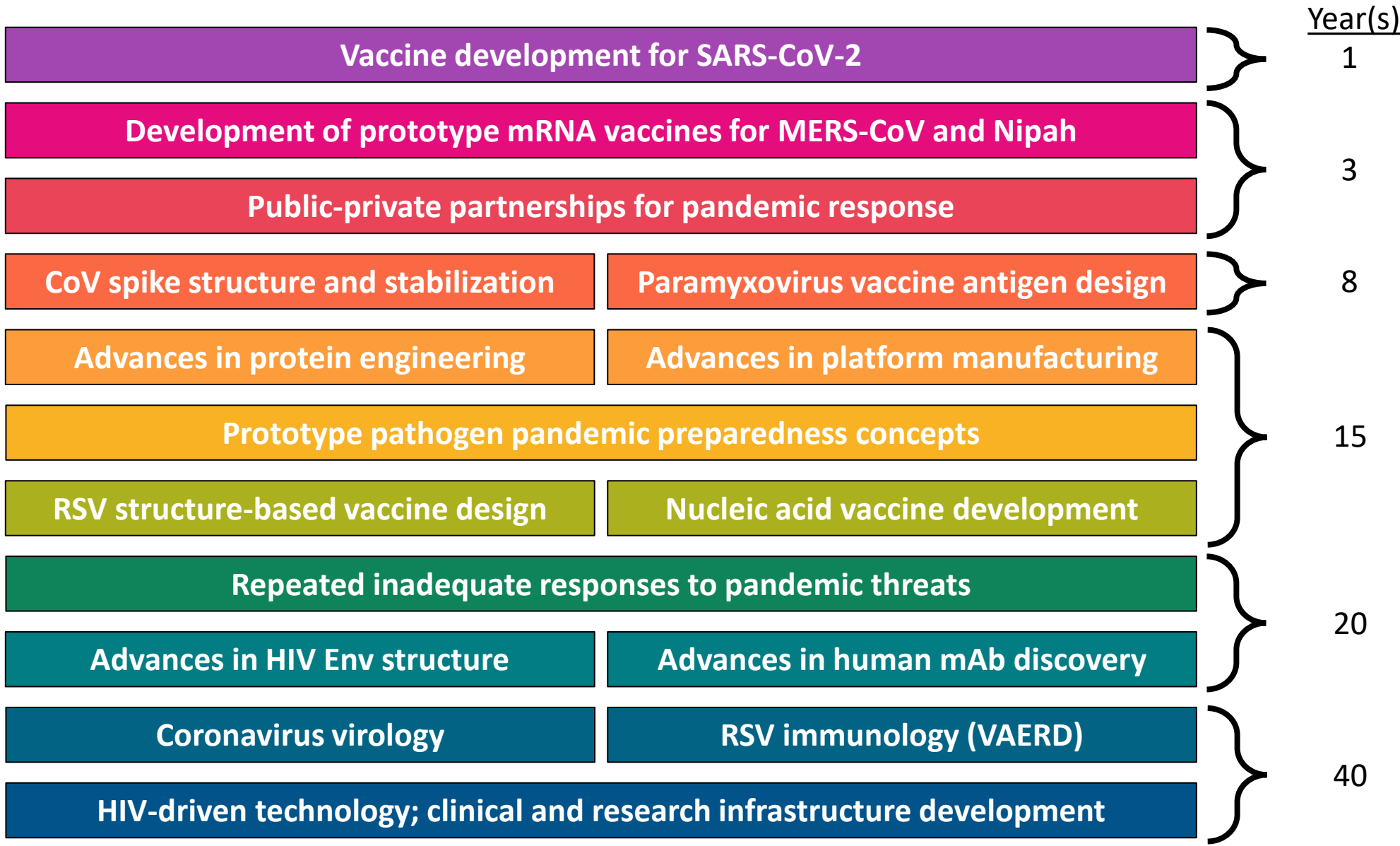


Government Coordination & Collaboration

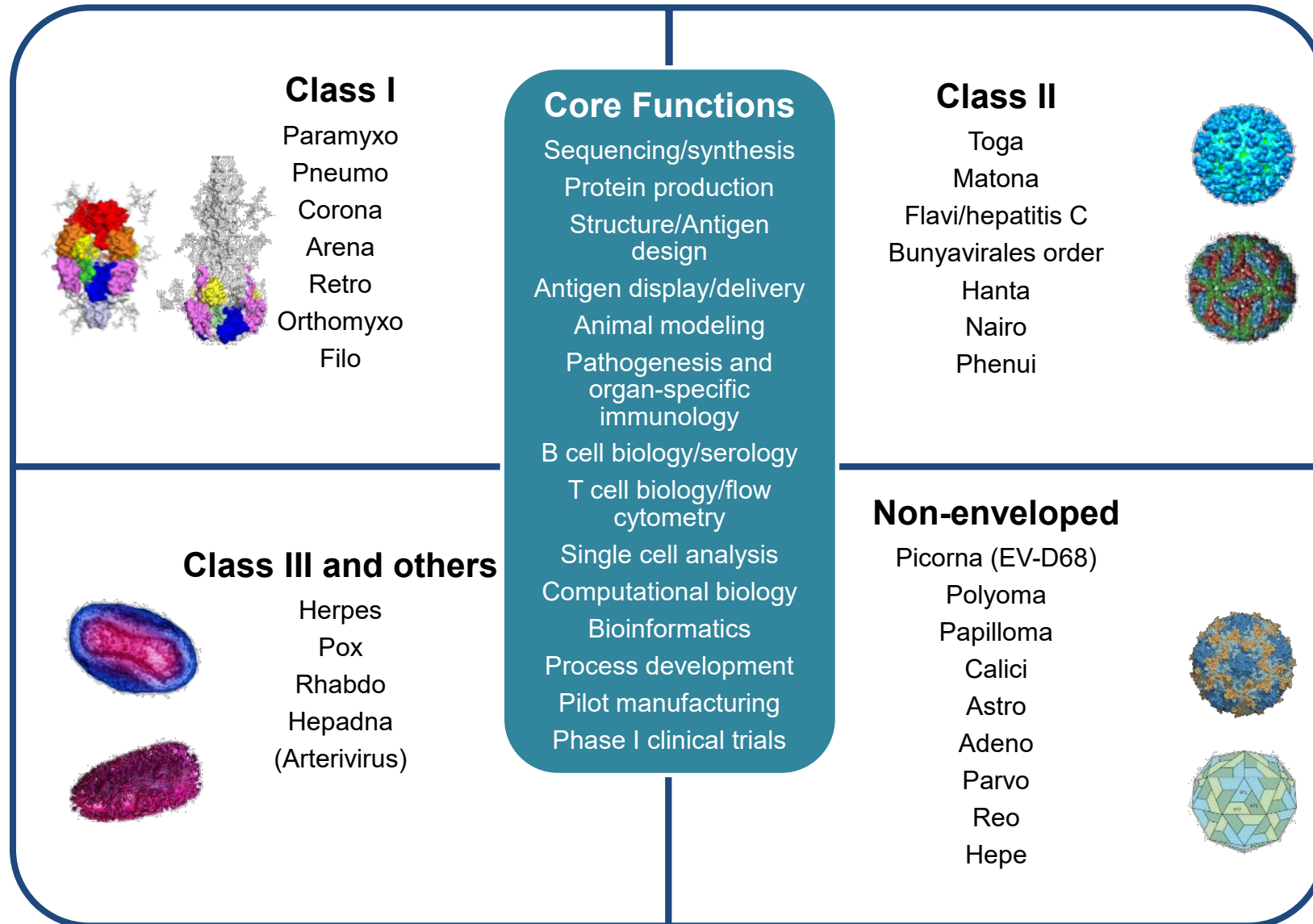
2002 SARS
2002 WNV
2005 Avian influenza
2006 **ASPR/BARDA**
2009 Swine influenza
2011 Chikungunya
2012 MERS
2014 Ebola
2016 Zika - ZLG
2020 SARS-CoV-2 - OWS
2022 **H-CORE - HHS Coordination Operations and Response Element**



Foundation for rapid COVID-19 vaccine development



Prototype Pathogen Approach for Pandemic Preparedness



- **~120 viruses from 26 families known to infect humans with potential for increased human-to-human transmission and virulence**
- **Develop vaccines for ~30 prototype viruses through phase 1**
- **Develop vaccine candidates (& reagents) for other ~90 through animal testing**

Graham & Sullivan.
Nature Immunology 2018