EMORY | YERKES NATIONAL PRIMATE RESEARCH CENTER

NPRC | NATIONAL PRIMATE RESEARCH CENTERS

Causes | Preventions | Treatments | Cures

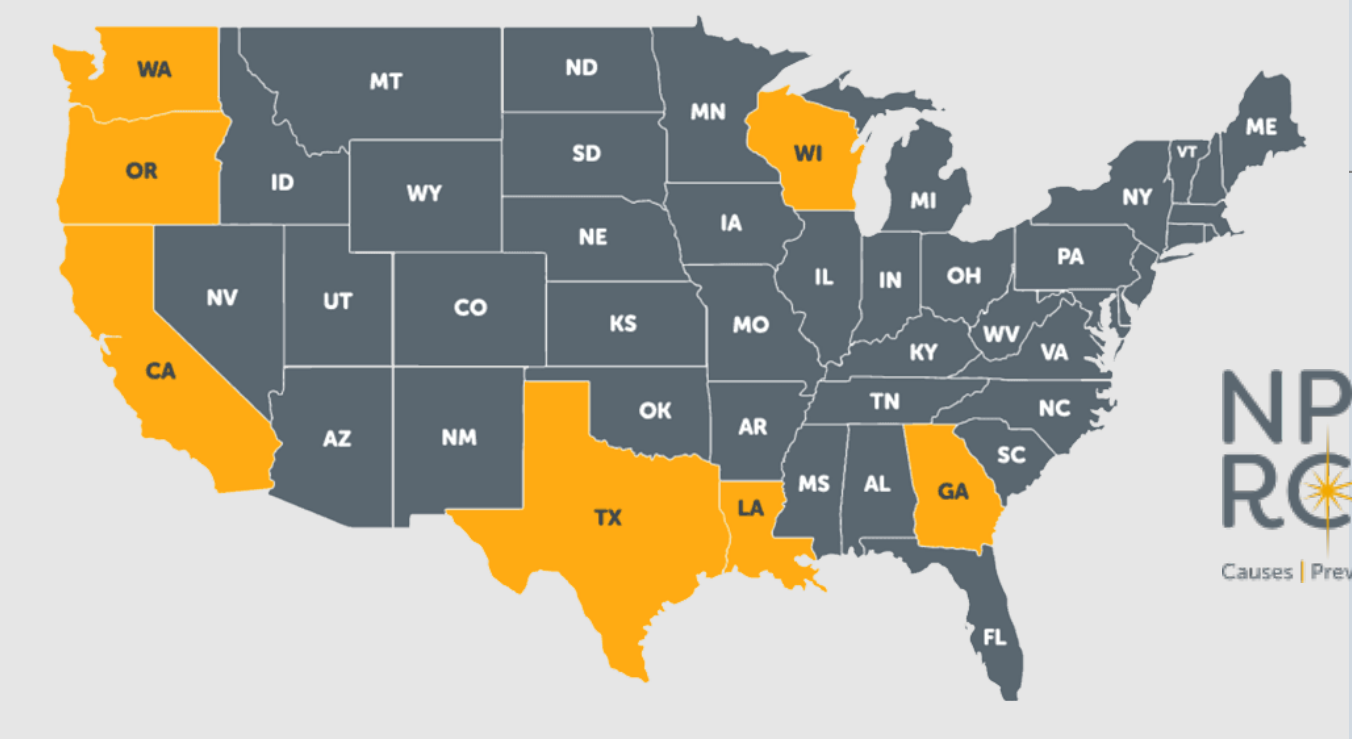
Management of a Nonhuman Primate Colony during SARS-CoV-2

YERKES NATIONAL PRIMATE RESEARCH CENTER

JOYCE COHEN, VMD, DACLAM

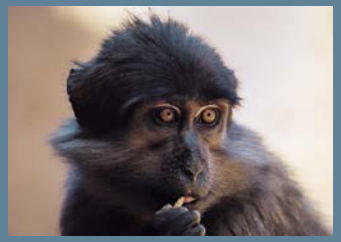
ASSOCIATE DIRECTOR OF ANIMAL RESOURCES

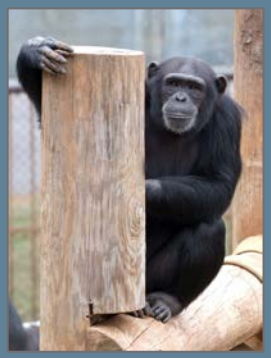
Seven National Primate Research Centers



Yerkes NPRC at Emory University
California NPRC at UC Davis
Oregon NPRC at OHSU
Southwest NPRC at Texas Biomedical Research Institute
Tulane NPRC at Tulane University
Washington NPRC at University of Washington
Wisconsin NPRC at University of Wisconsin, Madison

Yerkes National Primate Research Center





Main Station (25 acres)

~ 1000 NHPS across 6 species

~ 7,000 rodents

Research

Microbiology & Immunology

Neuroscience

Transplant

Field Station (117 acres)

~2500 NHPs across 3 species

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Management of a Nonhuman Primate Colony during COVID-19

Are NHPS Susceptible to SARS-CoV-2?

How do we protect the colony?

- Cancelling tours & visitors
- Routine PPE practices & reinforcement with staff
- Restricting access to essential personnel
- Consider N95s- PPE shortages
- Consider food prep practices
- Develop a barrier

How do we monitor the colony?

- Monitor for sick animals
- Isolation of clinical cases
- Development of NHP testing (PDWG)
  - Antibody testing
  - PCR
  - Fecal testing
- Animal contact tracing

Decreasing to "Essential" Research

NHP research is complex and often long term

NHPs are an extremely valuable and limited resource

Unable to stop breeding in spring (seasonal breeders)

Limited Research:

Postponed initiation of any new research projects

Decreasing experimental collection timepoints

Stopped new experimental surgeries

Moved study endpoints up earlier when feasible

Starting SARS-CoV-2 Research

Initiate SARS-CoV-2 research

Ramp up during lockdown

Bring ABSL3 facility online

Acquiring PPE during national shortage

Animal Program Adjustments for COVID-19

- Staffing reduction during initial lockdown (divided into two teams)
- Obtained IACUC approval for changes to cage sanitization frequency if needed
- Obtained IACUC approval to decrease animal cage socializations temporarily
- Decreased individual behavioral observation frequency to weekly
- Postponed large group annual health checks
- Postponed routine TB testing
- Postponed chimpanzee annual examinations

NPRC COVID 19 Responses

NPRC | NATIONAL PRIMATE RESEARCH CENTERS
Causes | Preventions | Treatments | Cures

West Coast NPRC responded early: March 4th implemented changes to programs

California NPRC

- Set up PCR and antibody screen in March to screen colony animals
- Developed a HEPA filtered barrier to preserve negative animals for COVID research (Put 76 animals in the barrier)

Washington NPRC

- Decreased timed-mating in managed breeding facility

Oregon NPRC

- ONPRC began a SARS-CoV-2 testing program for all asymptomatic staff that work with live NHPs by May 2020
  - Staff tested weekly or within 7 days of working with NHPs
- NHP contact tracing for positive staff members

NPRC COVID 19 Responses

NPRC | NATIONAL PRIMATE RESEARCH CENTERS
Causes | Preventions | Treatments | Cures

Southwest NPRC

- ABSL3 and ABSL4 allowed quick mobilization for pandemic research
- Quickly characterized 3 unique species in spring to test SARS-CoV-2 infection and disease progression (baboon, marmoset, and rhesus)
- Host institute is a private non-for-profit, with existing donors who immediately gave millions of dollars to Texas Biomed to quickly ramp up studies
- Existing infrastructure, personnel expertise and biocontainment allowed collaboration with both Pfizer and Regeneron on COVID-19 vaccine and antibody therapeutics
- Have implemented weekly testing on site for staff

Tulane NPRC

- Early rapid implementation of model development studies in the rhesus and AGM
- Implementation of biosafety protocols to allow sharing of research materials
- Development of a high containment core to provide laboratory research support services to investigators at BSL3 containment
- Compared aerosol exposure with multi-site instillation (IT/IN/IC) exposure routes

NPRC COVID 19 Responses

NPRC | NATIONAL PRIMATE RESEARCH CENTERS
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Wisconsin NPRC

- Offering twice weekly testing saliva test (RT-LAMP testing) for staff and household members with take home kits
- Positive cases referred to infectious disease clinician for diagnostic testing
- 2832 total reactions for WiNPRC employees/close contacts
  - There have been 9 total samples called positive for them - 7 true positives by qRT-PCR, and 2 were false positives.

Vaccines

5 NPRCS have offered COVID-19 vaccines to their animal resources staff working with NHPs
1 NPRC has offered vaccine to some of the staff
1 NPRC has not yet offered vaccine to staff

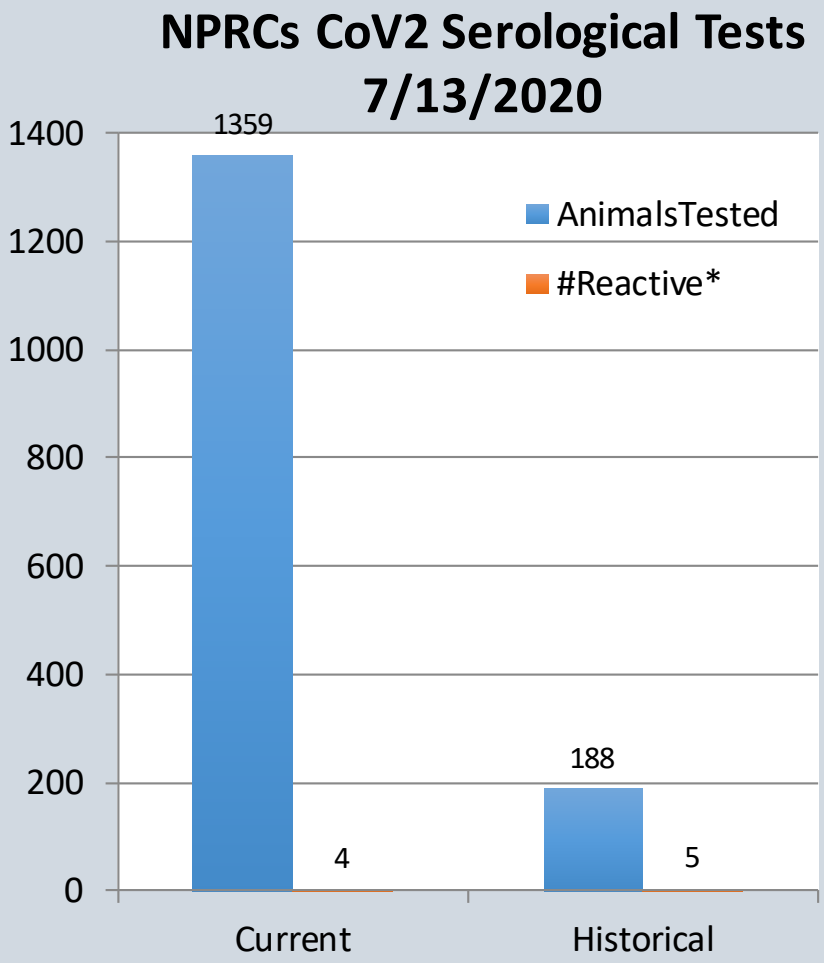
Pathogen Detection Working Group:
SARS CoV-2 NHP Testing Strategies and Targets

Guidance Document developed May 6

- Surveillance Data
- Antibody testing (spike protein)
  - Reagents (kits / antigens)
  - Controls
- PCR (nucleid capsid)
  - Sample types
  - Collection Materials (Swabs & Media), Stability
  - Extraction reagents, controls
  - Primers, Probes, Master Mix, Controls for Amplification
- Testing Algorithm

https://nprcresearch.org/primate/pathogen-detection/pathogens.php

Cumulative Summary of SARS-CoV-2 Testing at NPRCs



Surveillance to date:

The seven NPRCs have now tested **1305** animals for RNA by **PCR** and **8207** animals for **antibody** using various immunoassays

The survey population included rhesus macaques, pigtailed macaques, cynomologus macaques, Japanese macaques, baboons, mangabeys, squirrel monkeys, and chimps, from 8 different geographic locations throughout the NPRC system

No infections have been confirmed

NHP Natural Infections with SARS-CoV-2

1 African green monkey reported positive by natural infection at research facility

Gorillas at San Diego Zoo tests positive after exhibiting clinical signs (Jan 11th)

THE CORONAVIRUS CRISIS

Gorilla Gets Monoclonal Antibody Therapy For COVID-19

January 25, 2021 · 6:52 PM ET

DUSTIN JONES

Updated on Tuesday at 9:41 p.m. ET

A gorilla at the San Diego Zoo Safari Park in Escondido, Calif., underwent monoclonal antibody therapy after contracting COVID-19 this month.

Winston, an elderly silverback gorilla, and two other troop members tested positive for the coronavirus after they had symptoms such as mild coughing. "The virus was confirmed in 3 gorillas and we assume they all were exposed," Nadine Lamberski, the zoo's chief conservation and wildlife health officer, told NPR in an email. She said all the troop members were managed accordingly.

One of the eight gorillas in the troop at th Zoo Safari Park in California. Some of the contracted the coronavirus this month. O gorillas received monoclonal antibody the his treatment.

Ken Bohn/San Diego Zoo Global

Veterinary staff, concerned about Winston's age and underlying medical conditions, performed a diagnostic examination on him, a zoo statement said. He was found to have pneumonia and heart disease.

Harmonizing Coronavirus Research Across the NPRCs

Coronavirus Vaccine and Therapeutic Evaluation Network (CoVTEN)

Conserve and efficiently manage scarce NHP resources

Harmonize COVID research procedures across the NPRC program

Allocate COVID research resources to NIH **prioritized** research projects

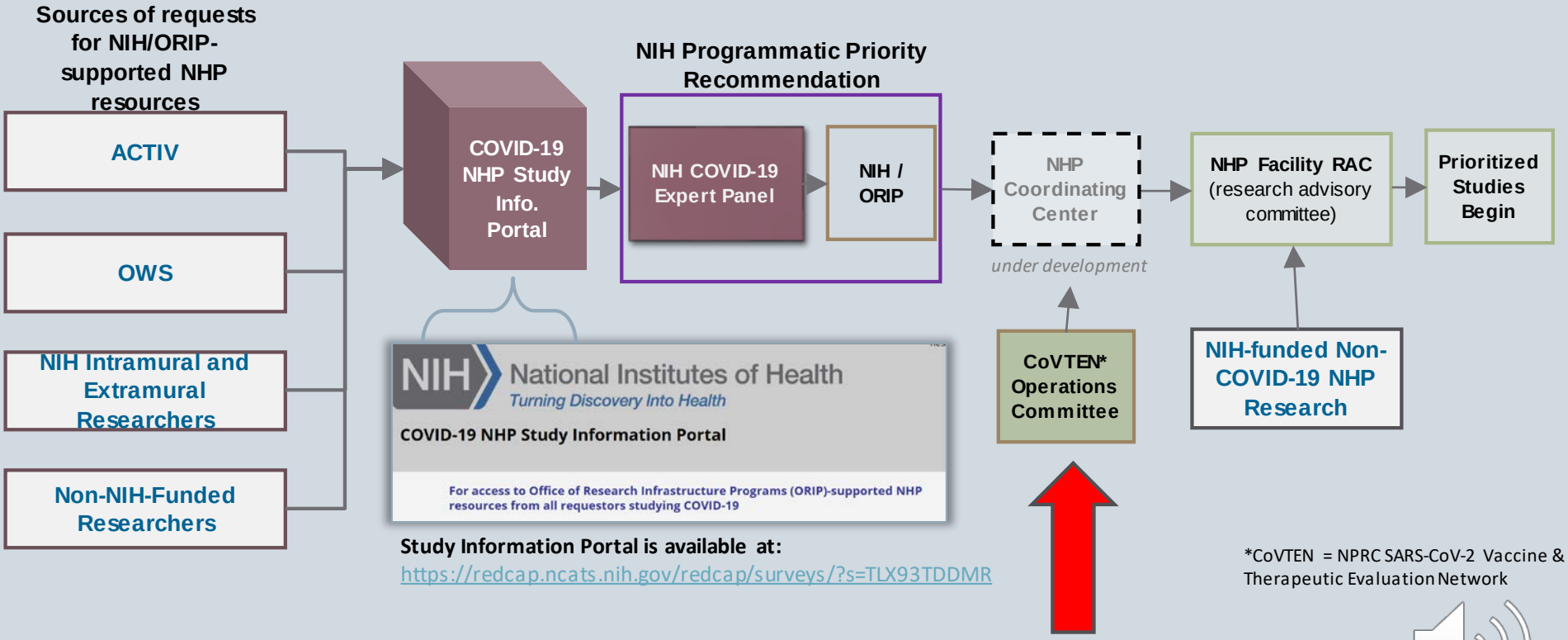
NIH Accelerating COVID-19 Therapeutic Interventions and Vaccines (ACTIV)

ACTIV is a public -private partnership to develop a coordinated research strategy for **prioritizing** and speeding development of the most promising treatments and vaccines.

COVID-19 Study Prioritization Process Overview

All COVID-19 studies requesting the use of NIH/ORIP-supported NHP research resources will undergo a programmatic prioritization

See the NIH Guide Notice for additional information: https://grants.nih.gov/grants/guide/notice-files/NOT-OD-20-173.html



Study Information Portal is available at:
https://redcap.ncats.nih.gov/redcap/surveys/?s=TLX93TDDMR

*CoVTEN = NPRC SARS-CoV-2 Vaccine & Therapeutic Evaluation Network

Lessons Learned

NPRC's and COVID-19 Research Current Status

Ongoing vaccine & therapeutic research at each NPRC

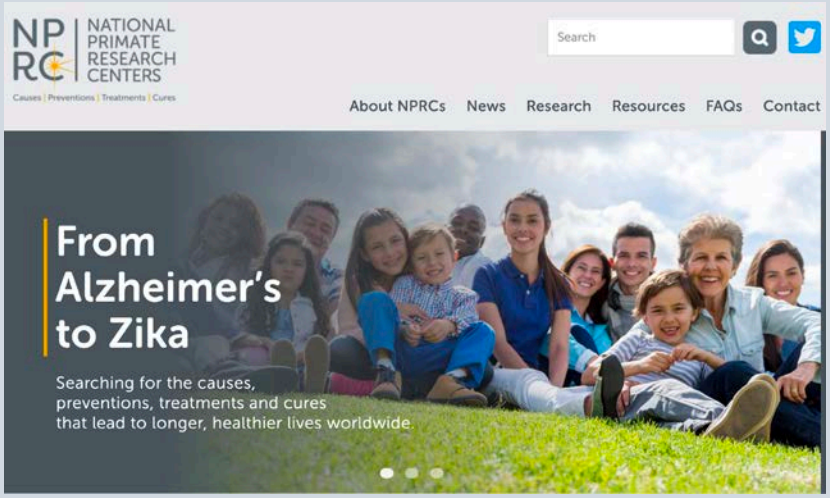
- Center specific research
- ACTIV study underway
- COVID-19 animal assignments prioritized by ACTIV and NIH

Ongoing monitoring of NHPs for evidence of naturally acquired COVID-19 infection

Working with NIH for infrastructure to facilitate expansion of NHP colonies to support research nationwide

For More Information

www.yerkes.emory.edu



www.nprc.org

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The National Primate Research Centers are helping people and animals across generations and the world live longer, healthier lives.