



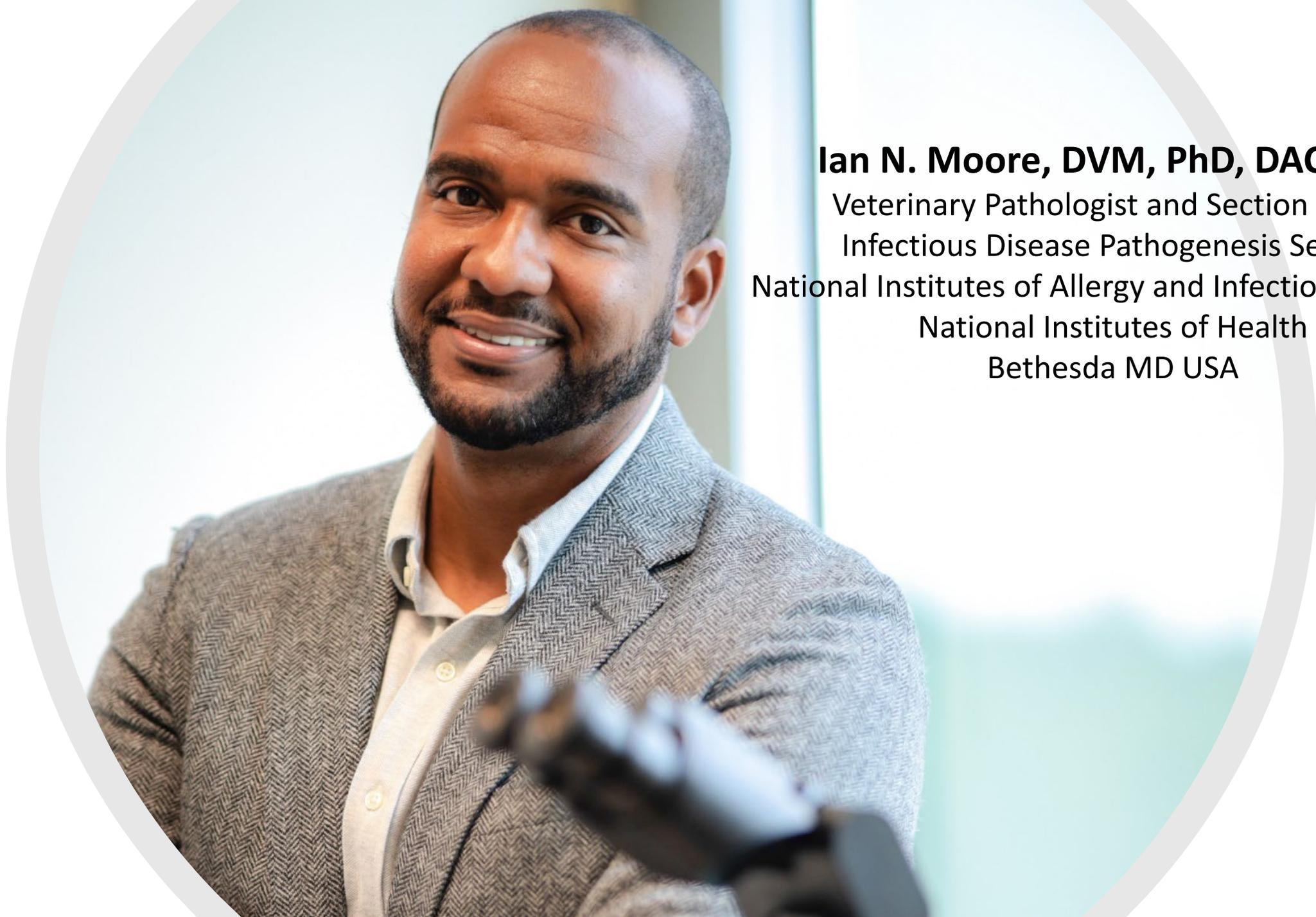
RAPID RESPONSE BY
LABORATORY ANIMAL RESEARCH INSTITUTIONS
DURING THE COVID-19 PANDEMIC: LESSONS LEARNED

► MARCH 9-10, 2021

A Virtual Workshop

The National
Academies of

SCIENCES
ENGINEERING
MEDICINE



Ian N. Moore, DVM, PhD, DACVP

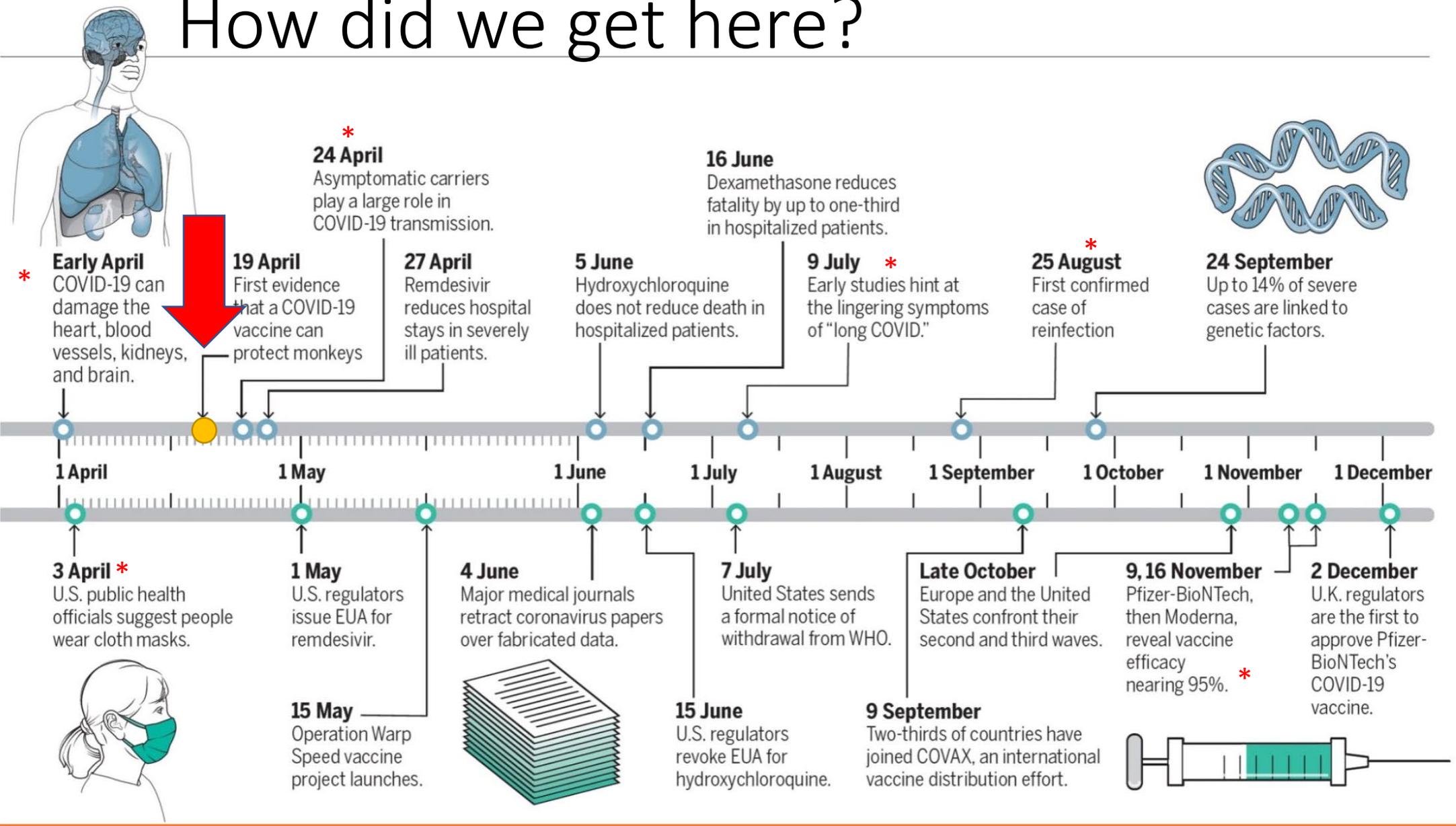
Veterinary Pathologist and Section Chief,
Infectious Disease Pathogenesis Section
National Institutes of Allergy and Infectious Diseases
National Institutes of Health
Bethesda MD USA

The COVID-19 Pandemic: The Triumphs and Challenges of Vaccine Development and Use of Animal Models in the Midst of a Pandemic



First confirmed death (outside of Asia) was in the US (CA) on Feb. 6th 2020

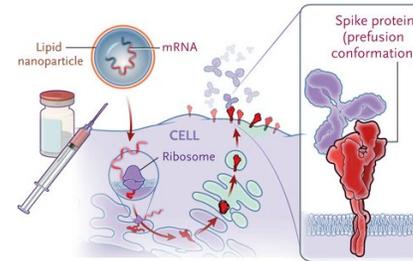
How did we get here?



How did we get here?

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

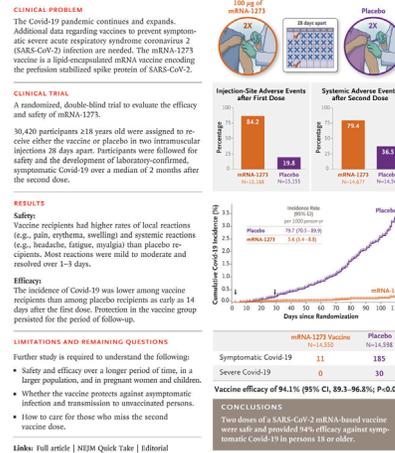


THE NEW ENGLAND JOURNAL of MEDICINE

RESEARCH SUMMARY

Efficacy and Safety of mRNA-1273 SARS-CoV-2 Vaccine

L.R. Baden, et al. DOI: 10.1056/NEJMoa2033889



Article

SARS-CoV-2 mRNA vaccine design enabled by prototype pathogen preparedness

Article

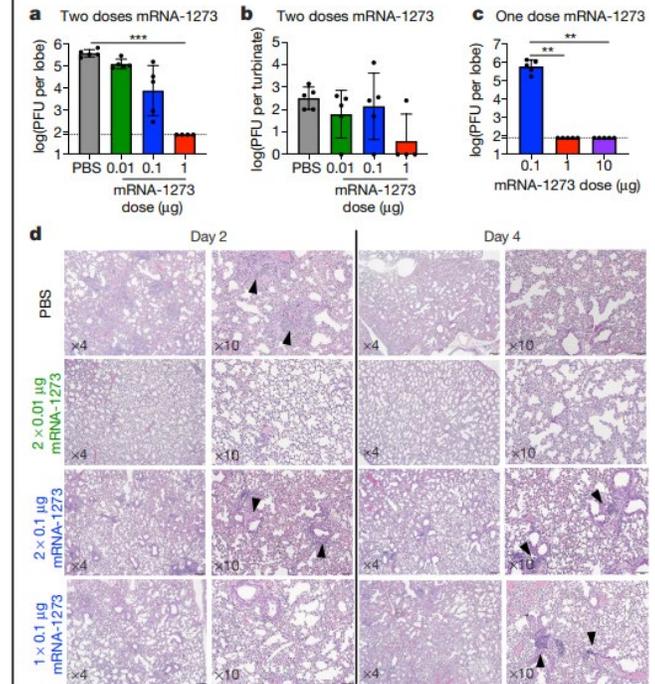


Fig. 4 | mRNA-1273 protects mice from upper- and lower-airway SARS-CoV-2 infection. a, b, BALB/c mice (n = 10 per group) immunized at weeks 0 and 3

Evaluation of the mRNA-1273 Vaccine against SARS-CoV-2 in Nonhuman Primates

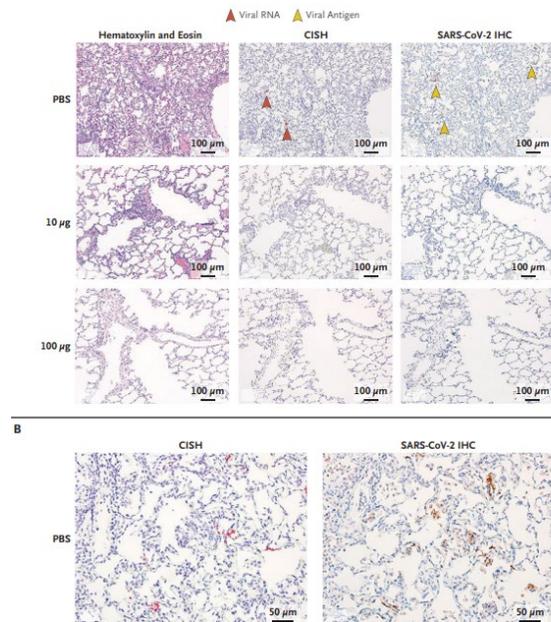
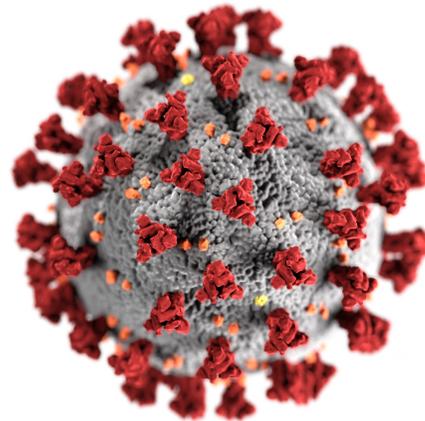


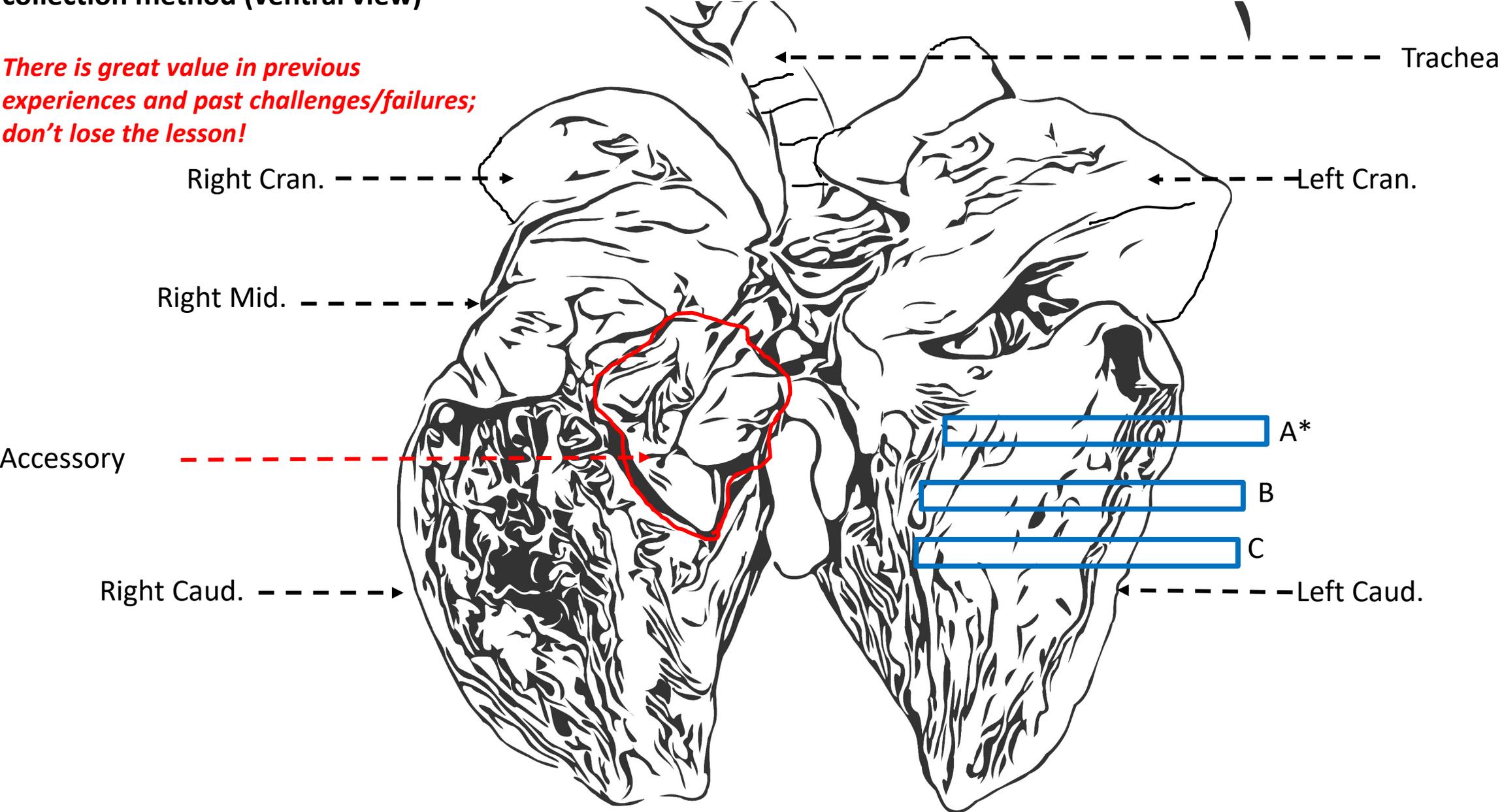
Figure 4. Lung Histopathological Analysis and Viral Detection 7 Days after Challenge in mRNA-1273–Vaccinated Rhesus Macaques.



How does an infectious disease research lab function (efficiently) in the face of a pandemic?

**IDPS Lung histopathology
collection method (ventral view)**

*There is great value in previous
experiences and past challenges/failures;
don't lose the lesson!*



Trachea

Right Cran.

Left Cran.

Right Mid.

Accessory

A*

B

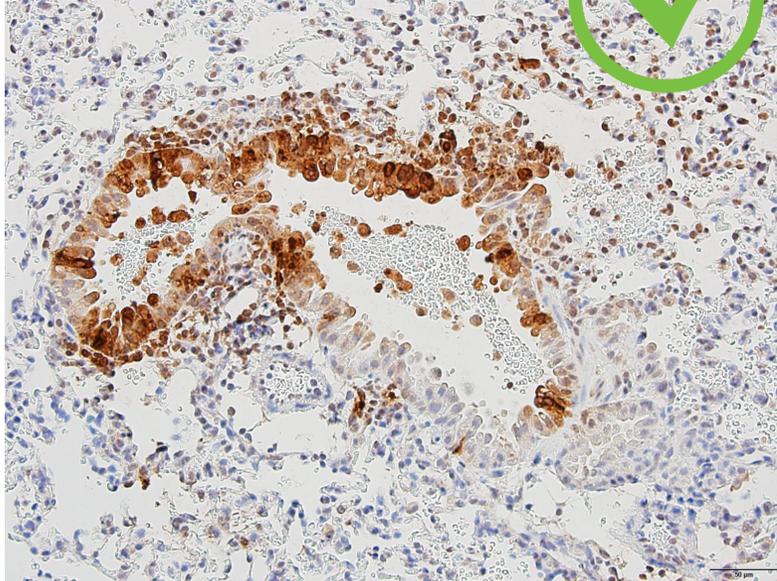
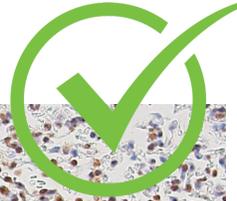
C

Right Caud.

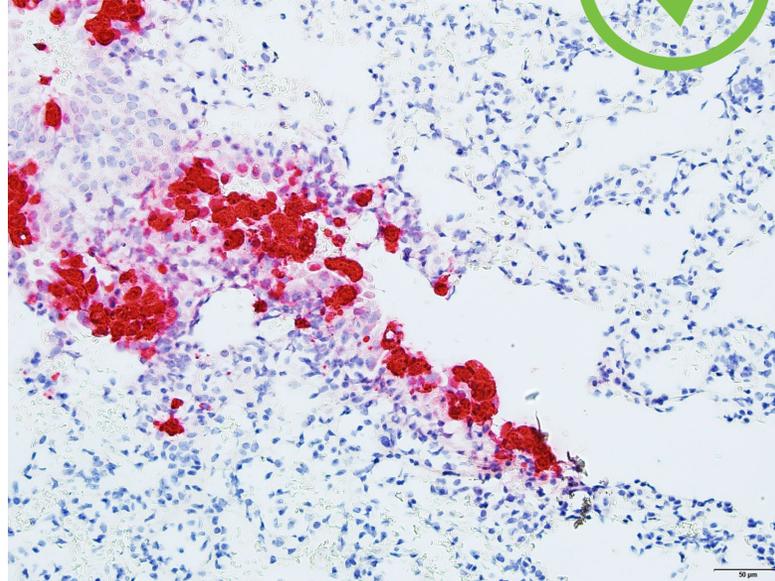
Left Caud.

* This method of sectioning (A, B and C) was performed on all lung lobes, except the **accessory lobe**

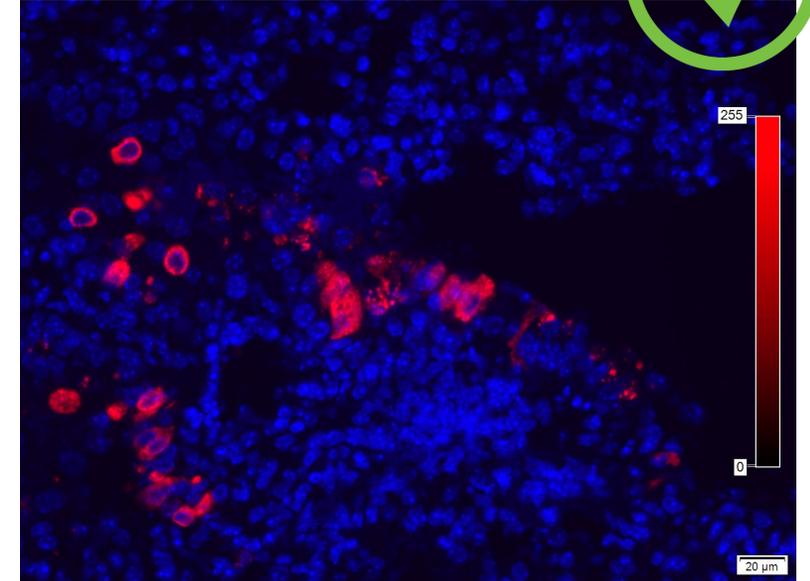
IHC



ISH

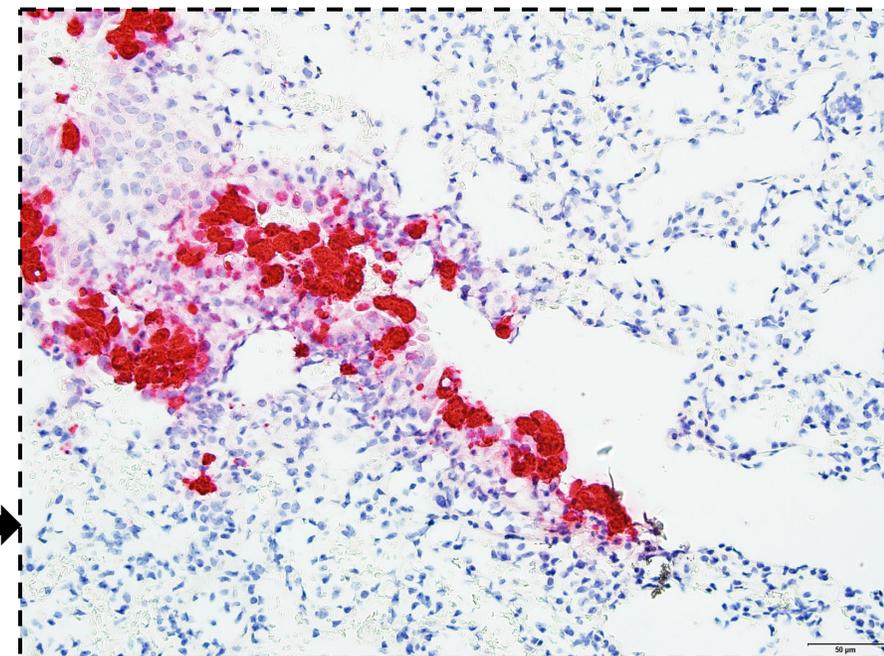
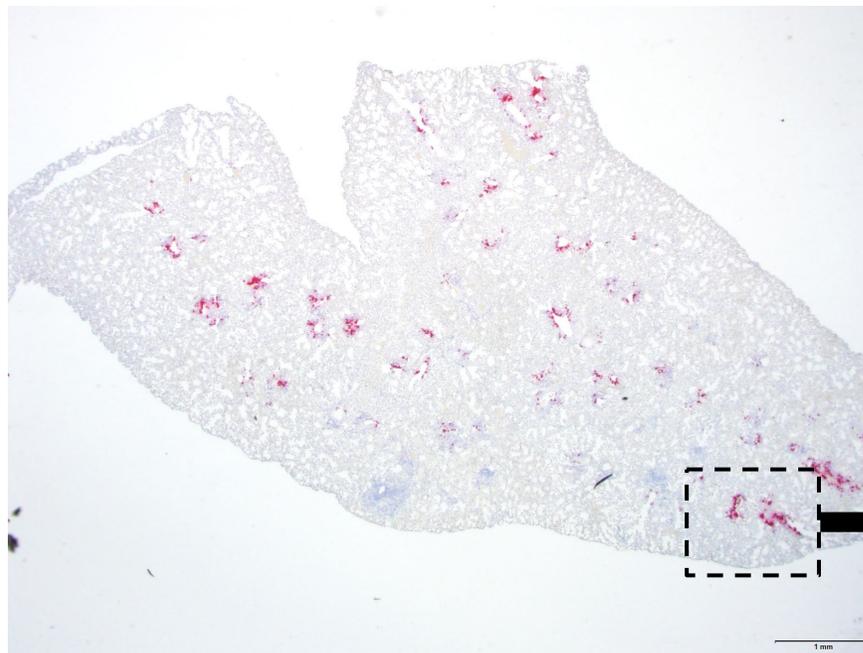


FISH

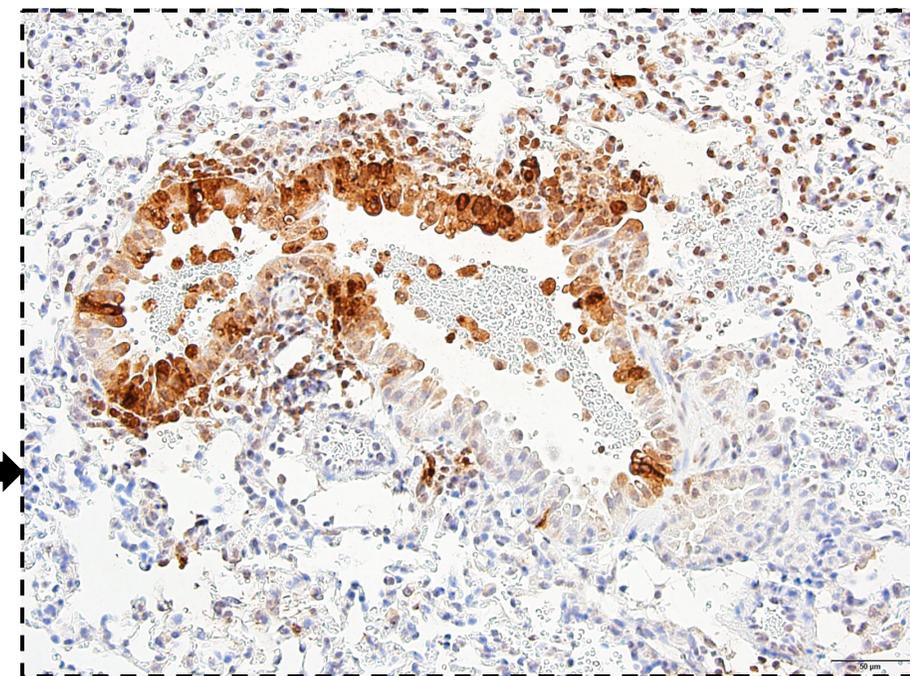
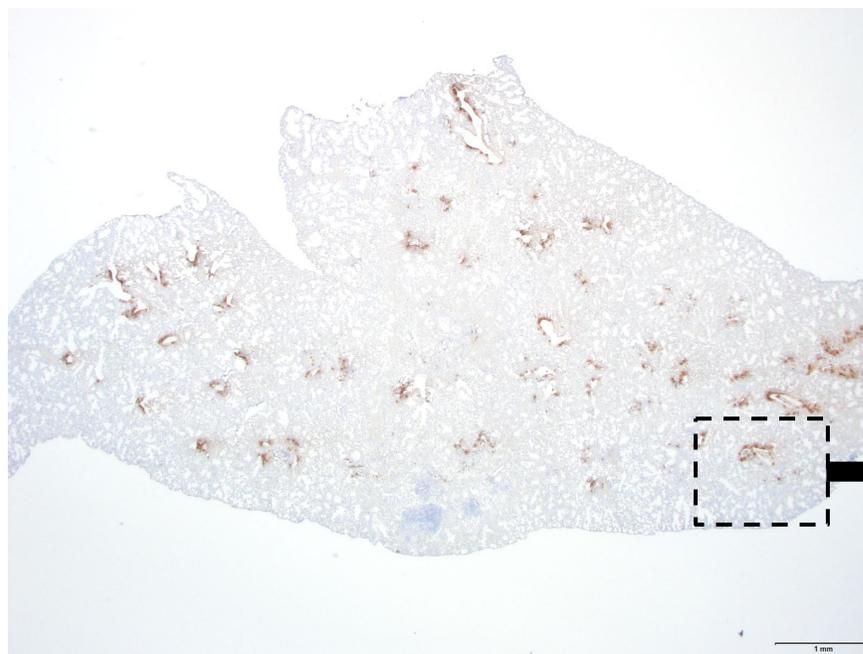


Getting ahead of unforeseen issues: ramping up assays and having agreement and redundancy in the system in order to help avoid problems that could be detrimental to the research process. In a pandemic, many of the normally available resources were either unavailable or were significantly delayed or on back order.

ISH



IHC





Mouse model
of SARS-CoV-2
infection

Reagent availability

Genetic variations/plasticity

Size and general husbandry

Availability of comparable data sets

A close-up photograph of a monkey's face, showing its eyes, nose, and mouth. The monkey has light brown fur and a pinkish-red face. The background is dark.

NHP model of SARS-CoV-2 infection

Reagent availability (?)
anatomical and physiologic compatibility (to humans)
Availability of comparable data sets



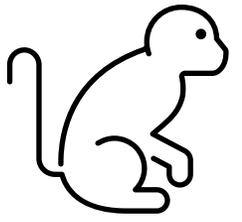
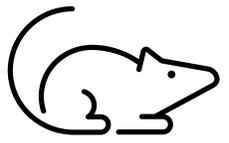
Hamster model of SARS-CoV-2 infection

- Reagent availability (?)
- Immune cell nuances
- Size and general husbandry
- Natural model of more severe disease outcomes
- Availability of comparable data sets

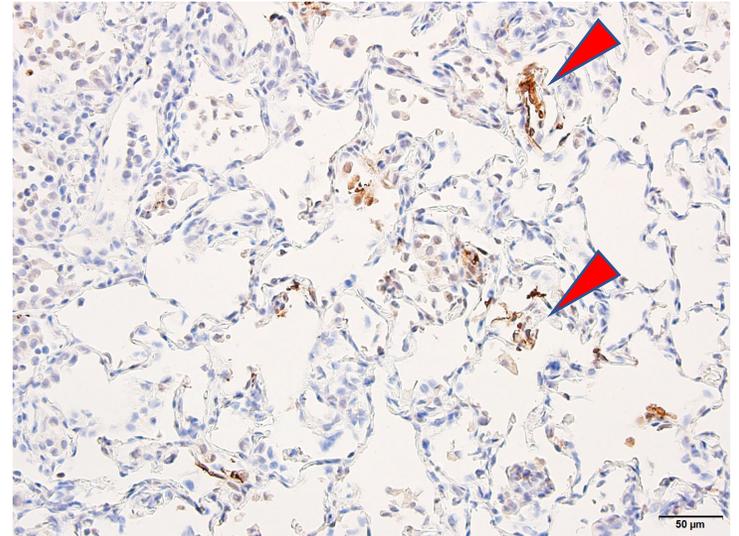
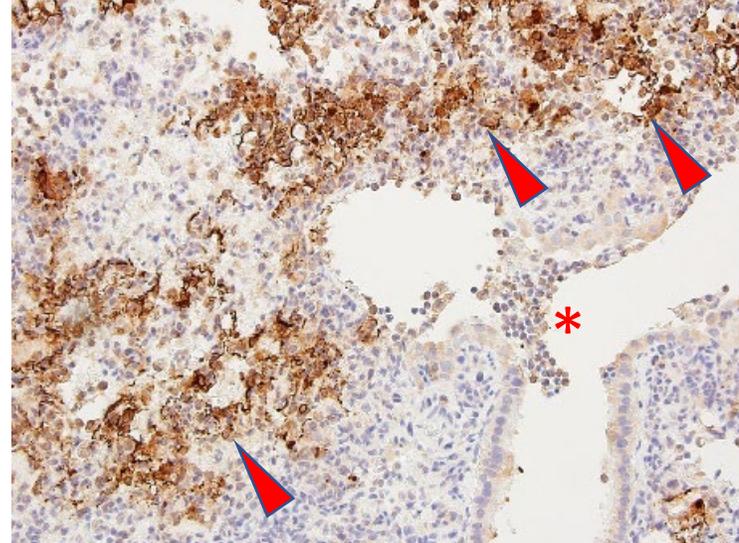
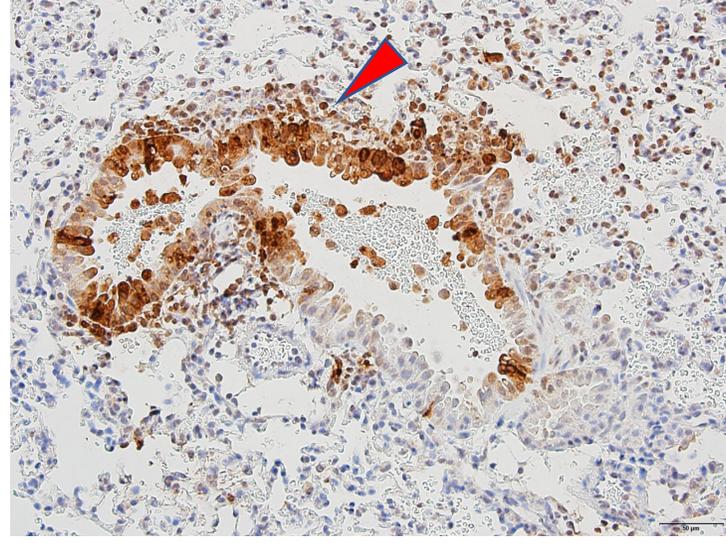


 = SARS-CoV-2 Ag

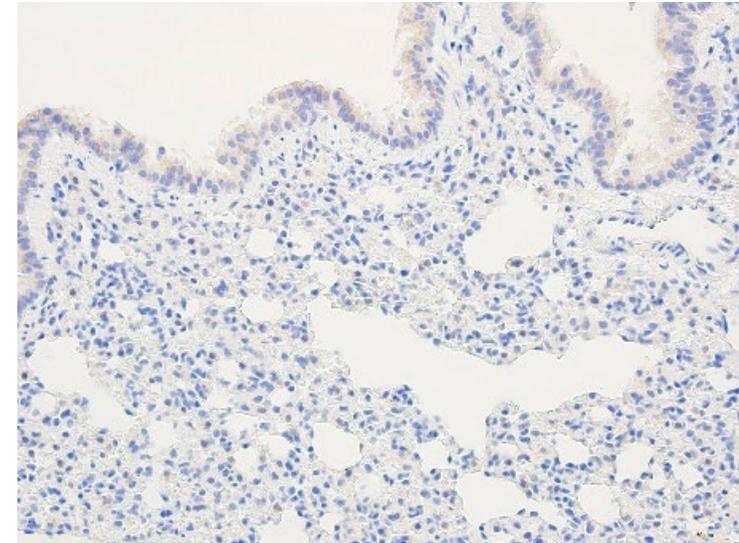
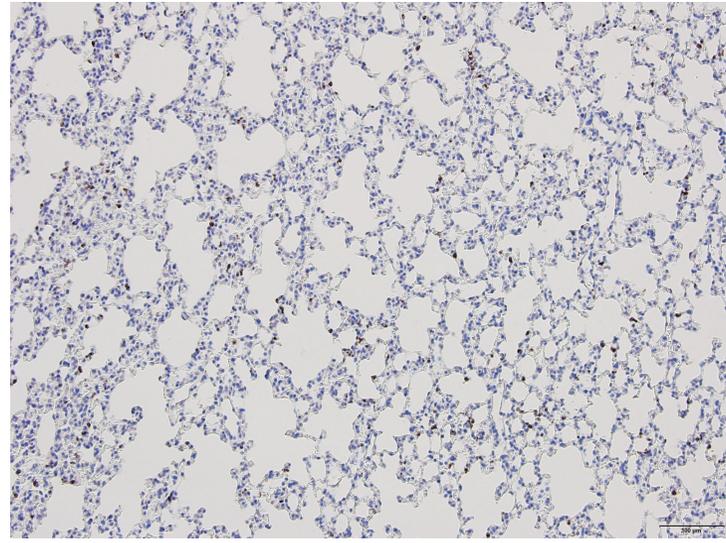
 = prominent inflammatory cell foci



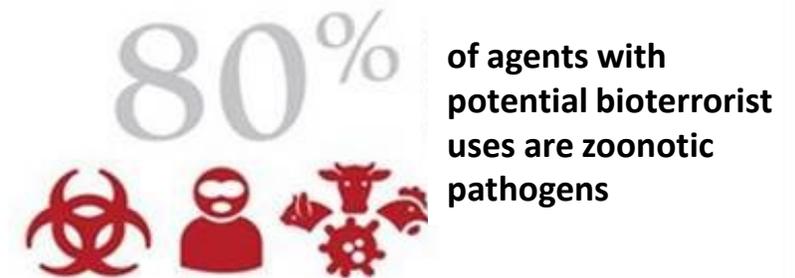
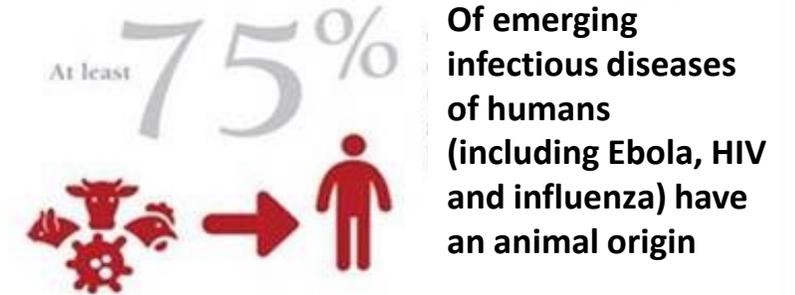
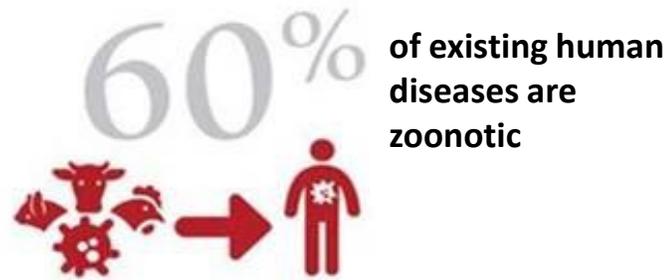
Infected



Mock



Mission
complete?
Why what we do
is so important



**MAY WE NEVER AGAIN TAKE
FOR GRANTED**

**FRIDAY NIGHTS WITH FRIENDS
BIRTHDAY CELEBRATIONS
THE ROAR OF A STADIUM
MORNINGS AT THE GYM
PACKED DANCE FLOORS
COFFEE WITH A FRIEND
CROWDED CONCERTS
HAPPY HOUR
LIFE ITSELF**

AMEN

**NOTHING SHOULD GO
BACK TO NORMAL.**

NORMAL WASN'T WORKING.

IF WE GO BACK TO

THE WAY THINGS WERE

WE WILL HAVE LOST

THE LESSON.

MAY WE RISE UP AND DO BETTER.

BE BETTER.



Thank you!

VRC Team

IDPS Staff

(Kevin, Mona and Bianca!)

NIH/NIAID

Bioqual