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Fall is here! We've already had some rain! We need more, but hopefully not all at once! It's a busy time here at the CNPRC- our base grant proposal for the next five years is coming due at the end of the Year. In tallying up the numbers we are reminded of and thankful for your entrusting samples from your projects to us for testing. Thank you. The end of the Year??? Already??? Just a reminder that we will not be accepting samples from Nov 22-26 and Dec 24-Jan 2 unless you make arrangements with us in advance. We are trying to head off potential problems because historically we've had shipping delays and lost packages during these dates.

After lots of delays, we are looking forward to a January publication date in the American Journal of Veterinary Research for our TB Assay paper- it describes the use of a Gamma Interferon Release Assay in 2 control and 3 spontaneous infection cohorts. https://avmajournals.avma.org/view/journals/ajvr/aop/ajvr.21.08.0124/ajvr.21.08.0124.xml

This Fall we were able to share our SARS-CoV-2 testing algorithms and surveillance data at the Nonhuman Primate Models of AIDS and the Association of Primate Veterinarians poster sessions. A copy from one of those meetings is attached.

As always, if you don't find the testing you need on our webpage, please contact us and we can discuss custom options. Again, thank you for your support. We wish you all a wonderful Holiday season.

JoAnn

SARS-CoV-2 Assays And Algorithms for Nonhuman Primate Surveillance

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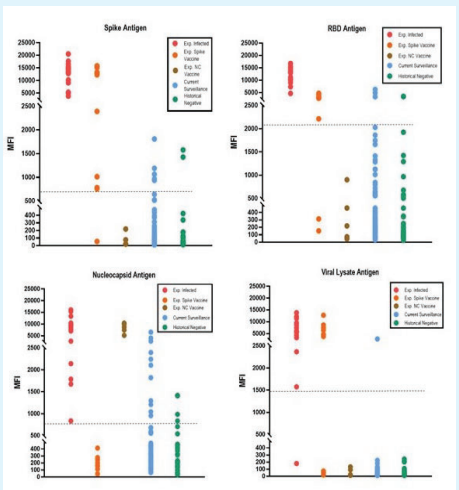
Introduction / Background

With the emergence of COVID 19 and the potential threat to nonhuman primates (NHP) the Primate Assay Laboratory (PAL), in collaboration with the National Primate Research Center (NPRC) Pathogen Detection Working Group (PDWG), was tasked with providing testing for SARS-CoV-2 surveillance. Although some commercial and research reagents and protocols were available, none were well validated for use in NHP.

Assay Development and Validation

PAL formatted a panel of antigens for antibody detection using enzyme immunoassay (EIA) and multiplex microbead immunoassay (MMIA) platforms with historical (pre-2018) serum as negative controls; and serum from experimentally infected animals as positive controls. Using the initial MMIA, antibody to one or more antigens was correctly identified in 16/16 samples from experimental infections (>10 days post inoculation); and specificity for spike (S), nucleocapsid (NC), receptor binding domain, and whole virus antigens was 96.2, 94.0, 94.6, and 97.8%, respectively on 103 current surveillance and 35 historical (pre 2018) archived samples. No samples were positive for both S and NC. Six PDWG laboratories compared this MMIA with 9 additional laboratory developed or commercially available assays using shared panels of known positive and negative samples.



Pathogen Detection Working Group Cross Center Study

www.nprcresearch.org/primate/pathogen-detection/PDWG%20Webpage%20Update%20March%202021_SAH.pdf

Assay	S-CoV-2 Antigens	Other Antigens
Xpress Spike ELISA	S1,S2	
Xpress Nucleocapsid ELISA	NC	
Intuitive Panel	S1, S2, NC	
MesoScale Dx Panel (human)	S, NC, RBD, NTD	HKU1 S, OC43 S, NL63S, 229E S, SARS-CoV-1 S
Charles River Lab MMIA	S, NP	HKU1 S, OC43 S, NL63S, 229E S
Tetracore MMIA (human)	S1, NC, RBD,	Variant S
Xmap MMIA (human)	S, NC, RBD, NTD	
California NPRC MMIA	S Trimer, NC, RBD, Viral Lysate	
Washington NPRC MMIA	S, NC	HKU1 S1, OC43 S, NL63S1, 229E S1, OC43 NP, NL63 NP 229E NP
Yerkes NPRC MMIA	S	

Negative / Indeterminate

Assay	# Tested	Interpretation: Positive (Reactive to S and NC)	Indeterminate (Reactive to S or NC)	Negative (No reactivity to S and NC)
Xpress Spike ELISA	62	4		58
YNPRC MIA	62	2		60
Intuitive Array	62	0	62	
MSD Panel	62	0	62	
WANPRC MMIA	62	0	62	
CRL MMIA	62	0	62	
Tetracore MMIA	28	0	1	27
Xmap MMIA	50	0	2	48
CNPRC MMIA	62	0	6	56

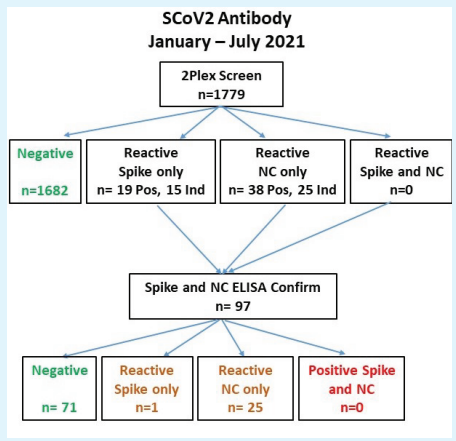
Exp. Infected (>=14 days)

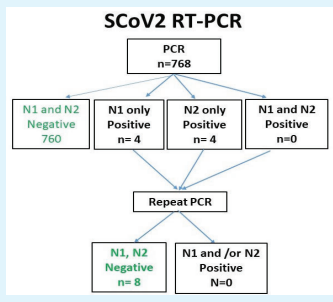
Assay	Species	# Tested	Positive	Interpretation: Indeterminate	Negative
Xpress Spike ELISA	MMU	8	8*		0
Xpress NC ELISA	MMU	4	4*		0
Yerkes NPRC MIA	MMU	8	8*		0
MesoScale Dx Panel	MMU	4	4	0	
Charles River Labs MMIA	MMU	8	7	1	
Washington NPRC MMIA	MMU	8	8	0	
Tetracore MMIA	MMU	2	2	0	0
California NPRC MMIA	MMU	8	8	0	0
Xpress Spike ELISA	AGM	3	3*		0
Yerkes NPRC MIA	AGM	3	3		0
MesoScale Dx Panel	AGM	2	2	0	
Charles River Labs MMIA	AGM	3	3	0	
Washington NPRC MMIA	AGM	3	3	0	
California NPRC MMIA	AGM	3	3	0	0
XMap MMIA	PAPIO	12	10	0	2^
Charles River Labs MMIA	PAPIO	12	6	4+2^	

^Infection failed

Current Testing Algorithm

The PAL MMIA has been further refined for use as a two-step screen and confirm algorithm. No known positive samples have been missed. Of the last 1780 surveillance samples, 98 were MMIA screen reactive requiring EIA confirmatory testing. 25 of the 98 confirmatory tests were reactive to NC only and 1 to S only; all others were non-reactive. Reactive samples were referred for PCR testing.





Conclusions

We have validated accurate assays and a testing algorithm to detect SARS-CoV-2 infection in non-human primates. Results compared favorably with other commercial and laboratory assays.

100% sensitivity has been demonstrated with samples from 16 experimentally infected animals. In addition antibody reactivity to the correct vaccine antigen was detected and differentiated in 8/10 animals receiving experimental spike and 6/6 nucleocapsid vaccine.

Using a screening and confirmatory testing algorithm 98.5% specificity has been achieved.

Over 10,000 animals across the seven NPRC's have been tested, with no detection of spontaneous infections.

Acknowledgements

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