

Clinical Laboratory COVID-19 Response Call

Monday, August 9, 2021, at 3:00 PM EDT

- **Welcome**

- Jasmine Chaitram, CDC Division of Laboratory Systems (DLS)

- **Use of Cycle Threshold (Ct) Values**

- Brandi Limbago, CDC Laboratory and Testing Task Force for the COVID-19 Response

- **SARS-CoV-2 Variants Update**

- Jessica Chen, CDC Laboratory and Testing Task Force for the COVID-19 Response

- **RADx Update**

- Bruce Tromberg, National Institutes of Health (NIH) RADx

- **Abbott BinaxNOW and Emerging Variants**

- Jennifer Frediani, Joshua Levy, Anuradha Rao, Leda Bassit, & Wilbur Lam, Emory University

Division of Laboratory Systems (DLS)

Vision

Exemplary laboratory science and practice advance clinical care, public health, and health equity.

Mission

Improve public health, patient outcomes, and health equity by advancing clinical and public health laboratory quality and safety, data and biorepository science, and workforce competency.



Four Goal Areas of DLS



Quality Laboratory Science

Improve the quality and value of laboratory medicine and biorepository science for better health outcomes and public health surveillance

Highly Competent Laboratory Workforce

Strengthen the laboratory workforce to support clinical and public health laboratory practice

Safe and Prepared Laboratories

Enhance the safety and response capabilities of clinical and public health laboratories

Accessible and Usable Laboratory Data

Increase access and use of laboratory data to support response, surveillance, and patient care

CDC Preparedness Portal

<https://www.cdc.gov/csels/dls/preparedlabs/covid-19-clinical-calls.html>

Find CLCR call information,
transcripts, and audio recordings on
the CDC Preparedness Portal

The screenshot displays the 'Prepared Laboratories' section of the CDC Preparedness Portal. The page title is 'Prepared Laboratories' and the breadcrumb is 'Prepared Laboratories > Outbreak & Response'. The left sidebar contains a navigation menu with 'Prepared Laboratories' at the top, followed by 'Preparedness Initiatives', 'Outbreak & Response' (which is expanded to show 'COVID-19' and 'Clinical Laboratory COVID-19 Response Calls'), and a list of months from July 2021 to January 2021. The main content area features a banner for 'Clinical Laboratory COVID-19 Response Calls' with a CDC logo and a background image of a virus particle. Below the banner, the text states: 'CDC's Division of Laboratory Systems (DLS) convenes regular calls with clinical laboratories to discuss the nation's clinical laboratory response to coronavirus disease (COVID-19). These Clinical Laboratory COVID-19 Response Calls take place every other Monday at 3:00 PM Eastern time. Audio and transcripts are posted online after each call.' It also provides instructions on how to submit questions and how to join the calls from various devices.

Schedule for Clinical Laboratory COVID-19 Response Calls

The next call will be on **Monday, August 23** from
3:00 PM to 4:00 PM EDT



We Want to Hear from You!

Training and Workforce Development

Questions about education and training?

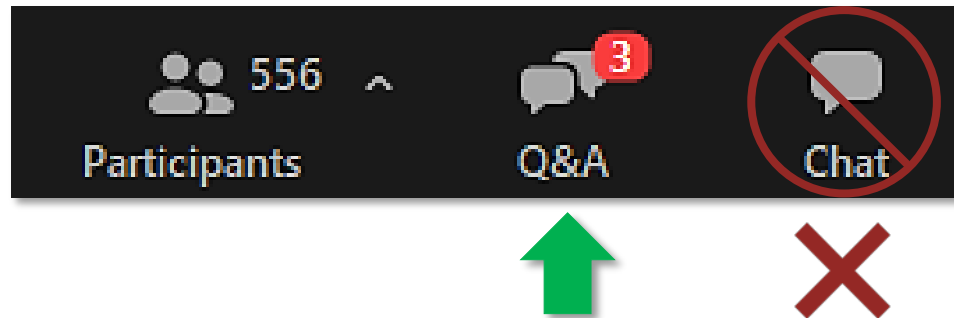
Contact LabTrainingNeeds@cdc.gov




How to Ask a Question

- **Using the Zoom Webinar System**

- Click the **Q&A** button in the Zoom webinar system
- Type your question in the **Q&A** box and submit it
- **Please do not submit a question using the chat button**



- For media questions, please contact CDC Media Relations at media@cdc.gov
- If you are a patient, please direct any questions to your healthcare provider



Slide decks may contain presentation material from panelists who are not affiliated with CDC. Presentation content from external panelists may not necessarily reflect CDC's official position on the topic(s) covered.

Use of Cycle Threshold (Ct) Values

Brandi Limbago

CDC Laboratory and Testing Task Force for the COVID-19 Response



U.S. Department of
Health and Human Services
Centers for Disease
Control and Prevention

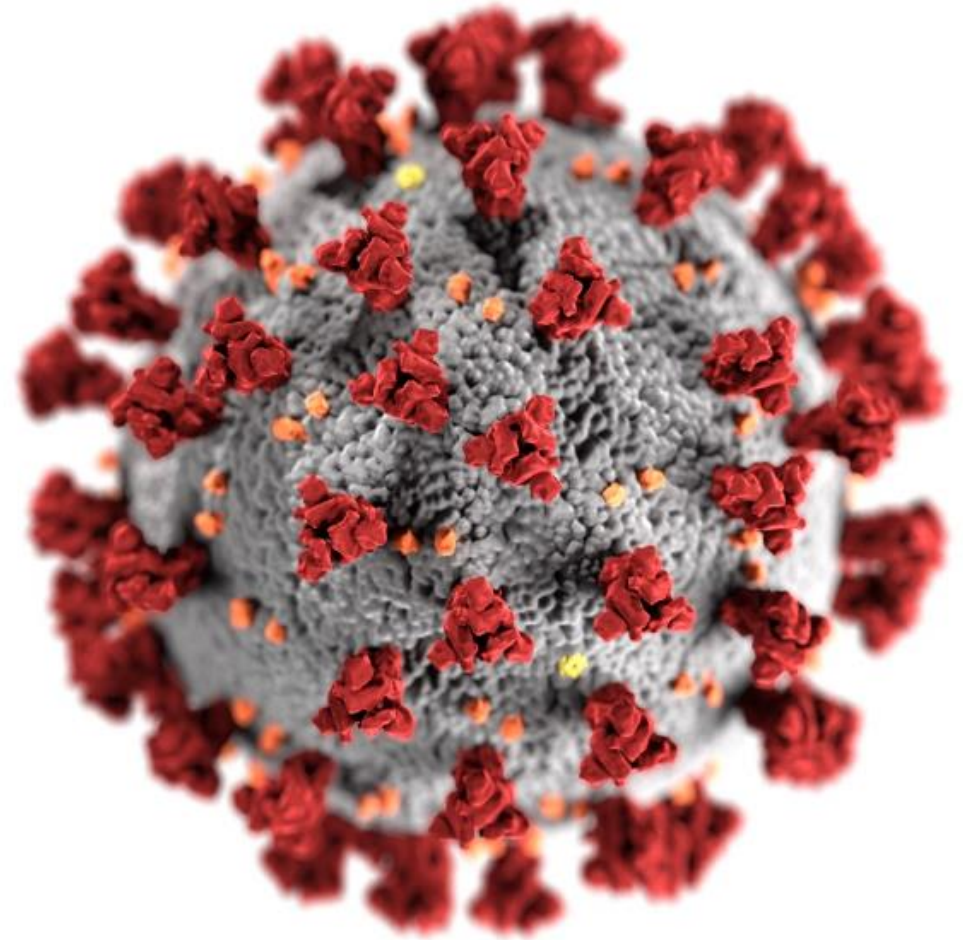
CDC Update on National SARS-CoV-2 Surveillance

Jessica Chen, PhD

Strain Surveillance and Emerging Variants Team

Laboratory and Testing Task Force

CDC COVID-19 Emergency Response

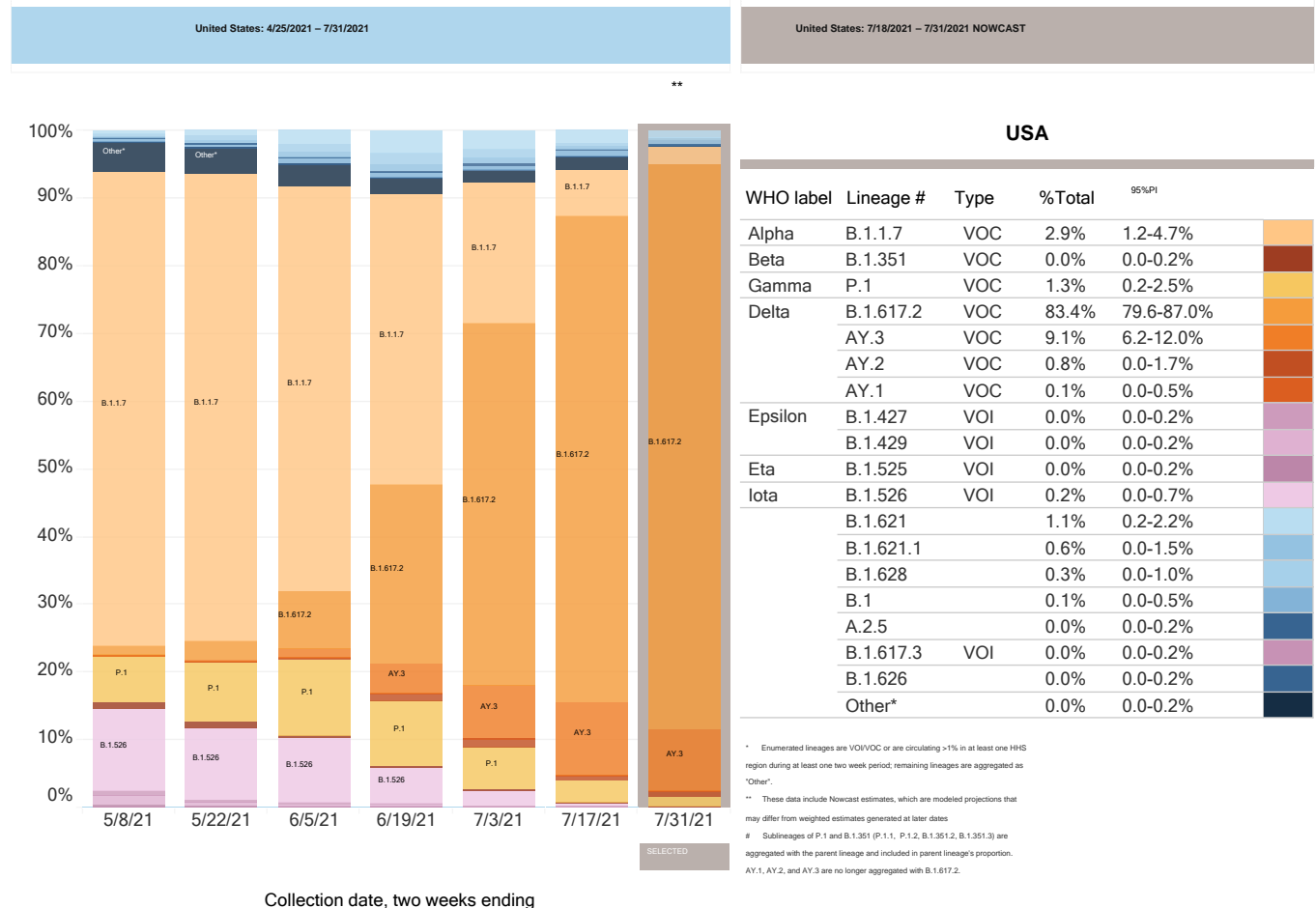


cdc.gov/coronavirus

National Nowcast Estimates of SARS-CoV-2 Lineages



- Delta (including sublineages) increased¹
 - From 82% to 93%
 - B.1.617.2 (83%)
 - AY.3 (9 %)
 - AY.2 (0.8%)
 - AY.1 (0.1%)
- Alpha (B.1.1.7) decreased
 - from 9% to 3%
- Gamma (P.1) decreased
 - from 4% to 1%

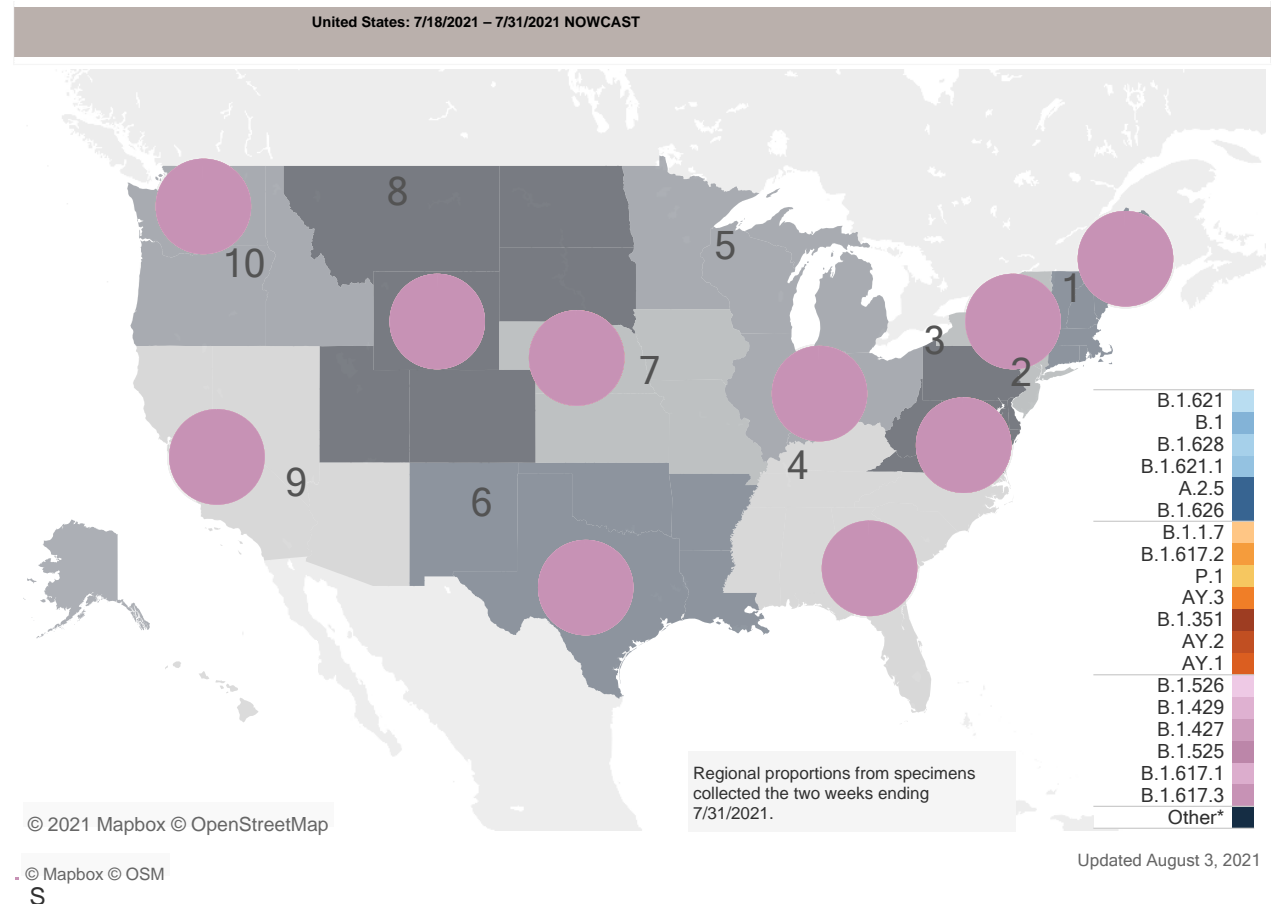


<https://covid.cdc.gov/covid-data-tracker/#variant-proportions>

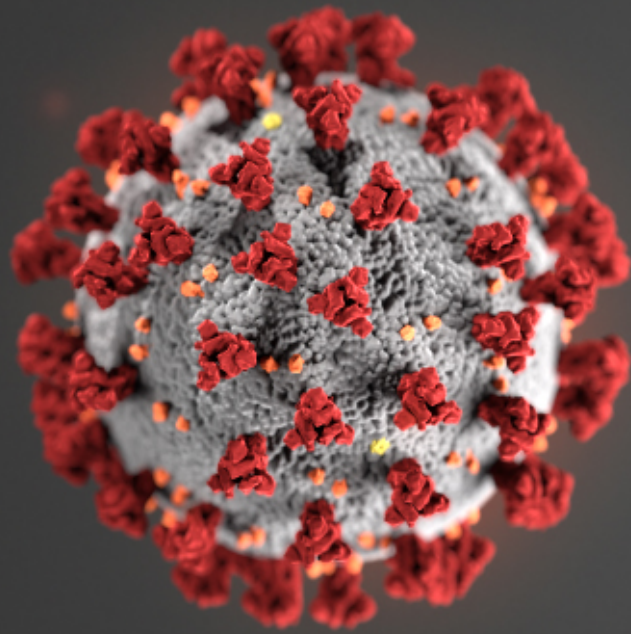
Regional Nowcast Proportion of SARS-CoV-2 Lineages



- Delta (B.1.617.2) predominates in all HHS regions
 - AY.3 is highest in Region 7 (33%)
 - AY.2 is highest in Region 9 (2%)
- Alpha (B.1.1.7) decreasing in all regions
 - Less than 7% in each region
- Gamma (P.1)
 - Decreasing in all HHS Regions
 - 3% or less in each region



<https://covid.cdc.gov/covid-data-tracker/#variant-proportions>



For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov

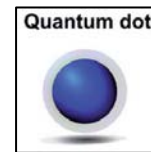
The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.



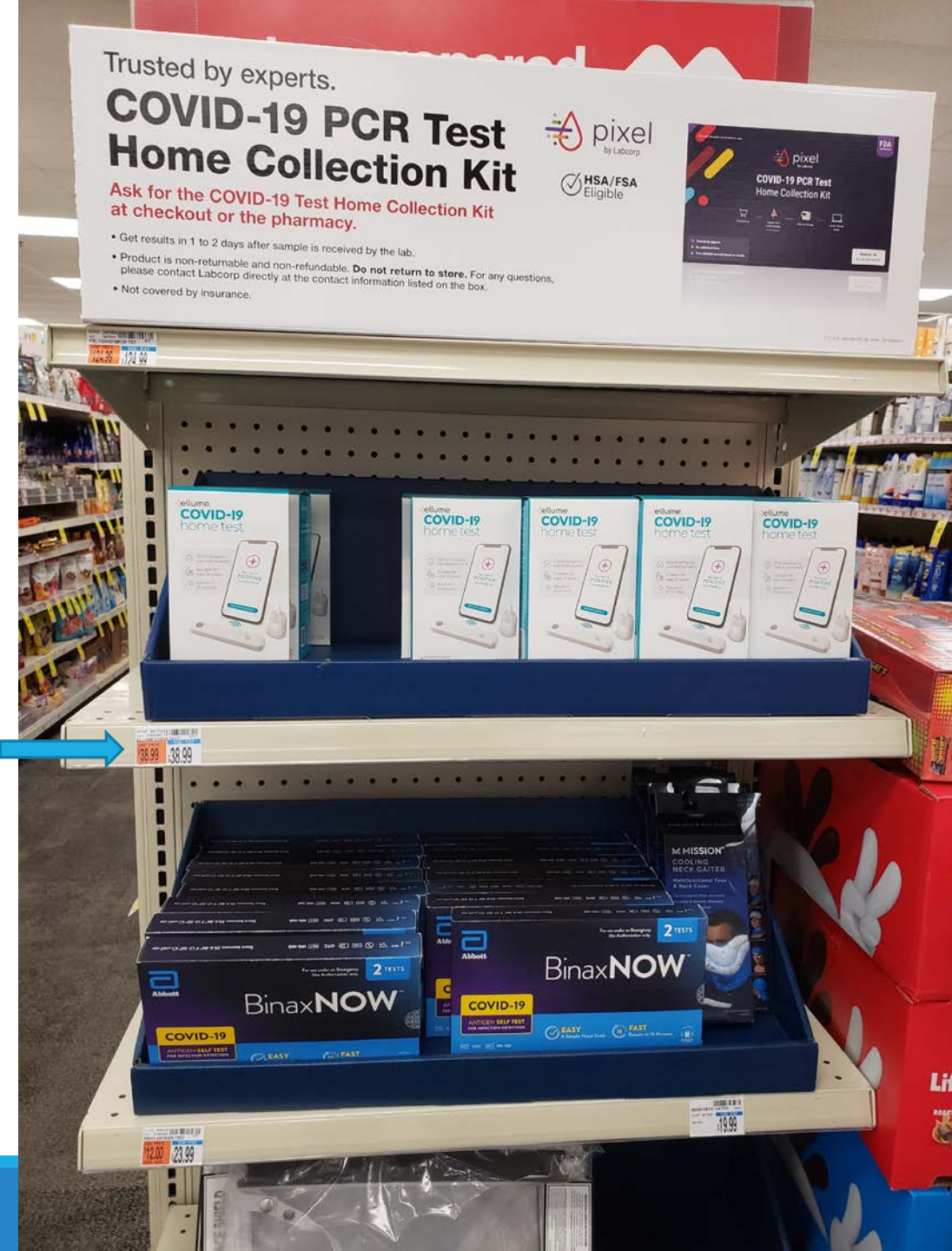
Rapid Acceleration of Diagnostics Technology (*RADx Tech*)

Bruce J. Tromberg, Ph.D.

Director, National Institute of Biomedical Imaging & Bioengineering (NIBIB)



NIBIB RADx Tech Leads: Jill Heemsker, Tiffani Lash, Todd Merchak, Mike Wolfson, Doug Sheeley, David George, Gene Civillico, Bill Heetderks, Charles Anamelechi, Matt McMahon, Felicia Qashu, Tony Kirilusha, Mark Snyder, Andrew Weitz, Krishna Juluru, Ilana Goldberg, Taylor Gilliland, Kate Egan, Ray MacDougall, Patty Wiley, Jennifer Jackson



RADx: Unexpected Opportunity

April 24, 2020: \$1.5B to NIH
\$500 Million to NIBIB

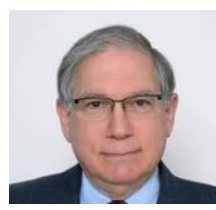
NIH Office of the Director



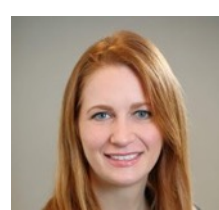
Francis Collins



Rachael Fleurance



Larry Tabak



Tara Schwetz

April 29

- 1) Expand COVID-19 Testing Technologies: *Number, Type and Access*
- 2) Optimize Performance: *Technologic and Operational; Match Community Needs*

RADx Tech – \$500M

Highly competitive, rapid three-phase challenge to identify the best candidates for at-home or point-of-care tests for COVID-19

RADx Advanced Technology Platforms (RADx-ATP) – \$230M

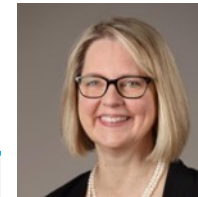
Rapid scale-up of advanced technologies to increase rapidity and enhance and validate throughput – create ultra-high throughput machines and facilities

RADx Radical (RADx-Rad) – \$200M

Develop and advance novel, non-traditional approaches or new applications of existing approaches for testing

RADx Underserved Populations (RADx-UP) – \$500M

Interlinked community-based demonstration projects focused on implementation strategies to enable and enhance testing of COVID-19 in vulnerable populations



Jill Heemskerk



Bruce Tromberg

National Institute of Biomedical Imaging and Bioengineering (NIBIB)



\$307 M Partnership



<https://www.nih.gov/research-training/medical-research-initiatives/radx>

RADx: Leverage Existing Network (POCTRN)

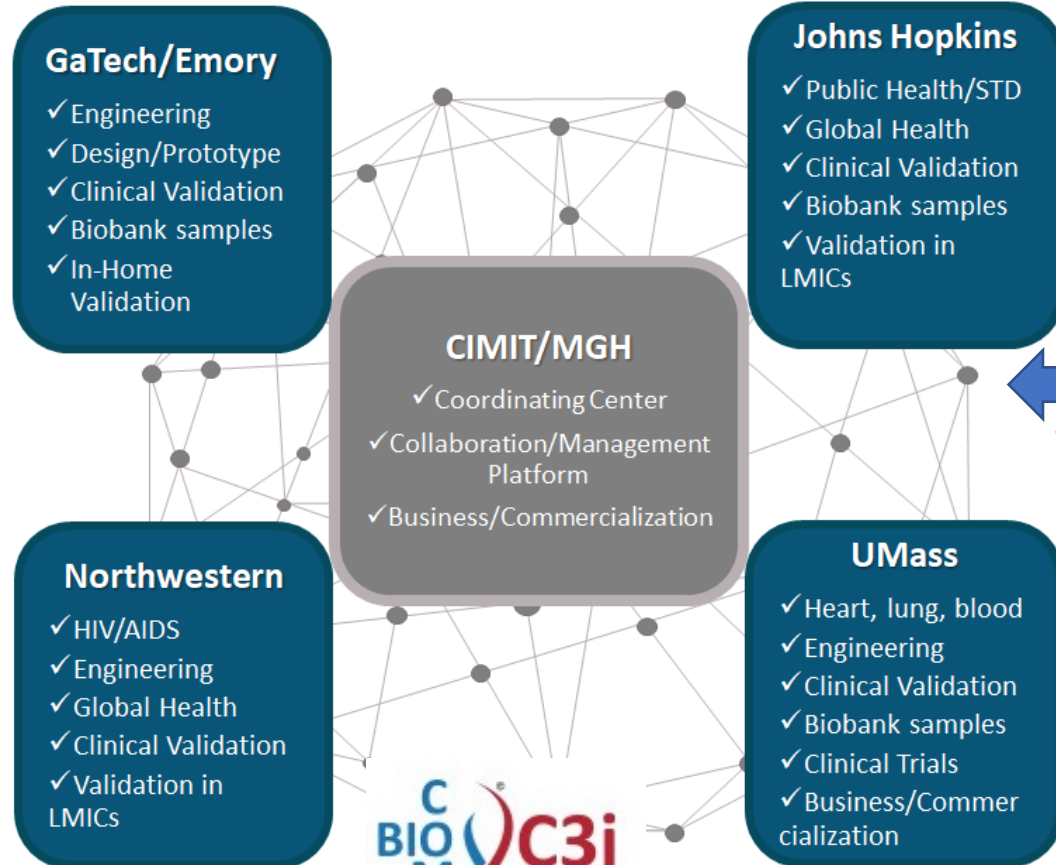
NIBIB Point of Care Tech Network: NHLBI, NIAID, NCCIH, FIC, OBSSR, OAR, ODP

Established 2007, Expanded 2020: >900 RADx experts & contributors
(USG, Academia, Industry, NFP)

<https://www.poctrn.org>



Todd Merchak Tiffany Lash



Validation Core

>60 projects complete,
>2500 participants



Clinical Studies Core

Standard Trial Design, Digital Health Platform, Single IRB, Center Network



Deployment Core

Supply chain, Manufacturing, User Community, *whentotest.org* ASU testing common Project N95

Operations:

- Review & Fund
- Test & Validate
- Expert Guidance

RADx: *Tech Innovation Funnel Process*



~3000
Applications
Started

Rolling submission
open April 29

5-6 Months

FAST TRACK FOR ADVANCED DIAGNOSTIC TECHNOLOGIES



716



140



47

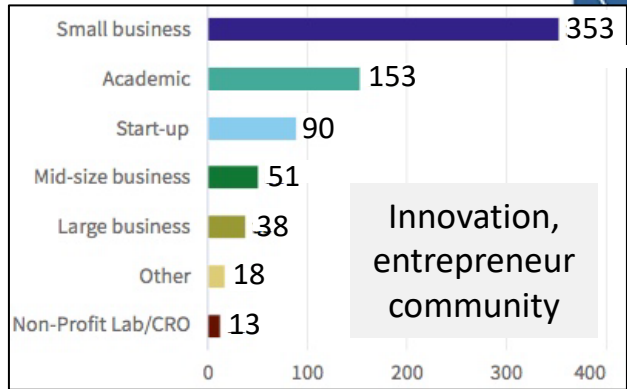


33



**Validation, Clinical Testing,
Regulatory, Manufacturing,
Distribution**

~\$600M



**Projects in
each Phase**



Mesa BioTech

Quidel QuickVue

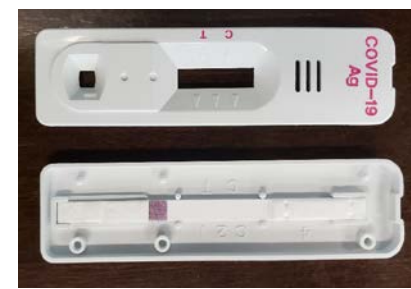


Quidel Sophia

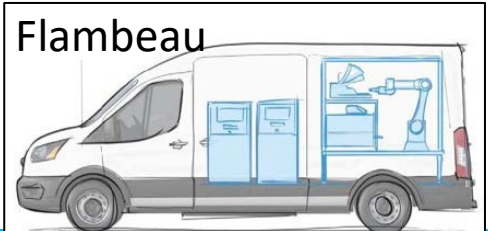
Meridian



Genbody



ANP



Flambeau

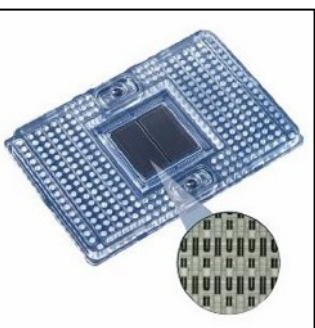
Quanterix Simoa



Luminostics



Visby Medical



Fluidigm

Point of Care & Home	
Visby	RTPCR
Mesa	RTPCR
MicroGem	RTPCR
Talis	ISO-PCR
Ubiquitome	RTPCR
Meridian	RTPCR
GenBody	An-LFA
Quidel Sophia	An-LFA
Quidel QuickView	An-LFA
Luminostics	An-LFA
ANP	An-LFA
Ellume	An-LFA
Xtrava	An-LFA
Qorvo	An-BAW
Mologic	An-LFA
Maxim	An-LFA
Salignostics	An-LFA
Laboratory	
Flambeau	PCR-mobile-lab
MatMaCorp	RTPCR-mini-lab
Fluidigm	RTPCR
Quanterix	SIMOA (An)
Minute Molecular	RTPCR
PathogenDx	RTPCR
Broad Inst	RTPCR
Illumina	NGS
Helix	NGS/RTPCR
Gingko	NGS/RTPCR
Sonic Healthcare	RTPCR
PathGroup	RTPCR
Aegis	RTPCR
Lab Products	
Mammoth Biosci	CRISPR
Ceres Nanosciences	Beads/Conc
Oasis	Saliva Collect
Yukon	Swabs

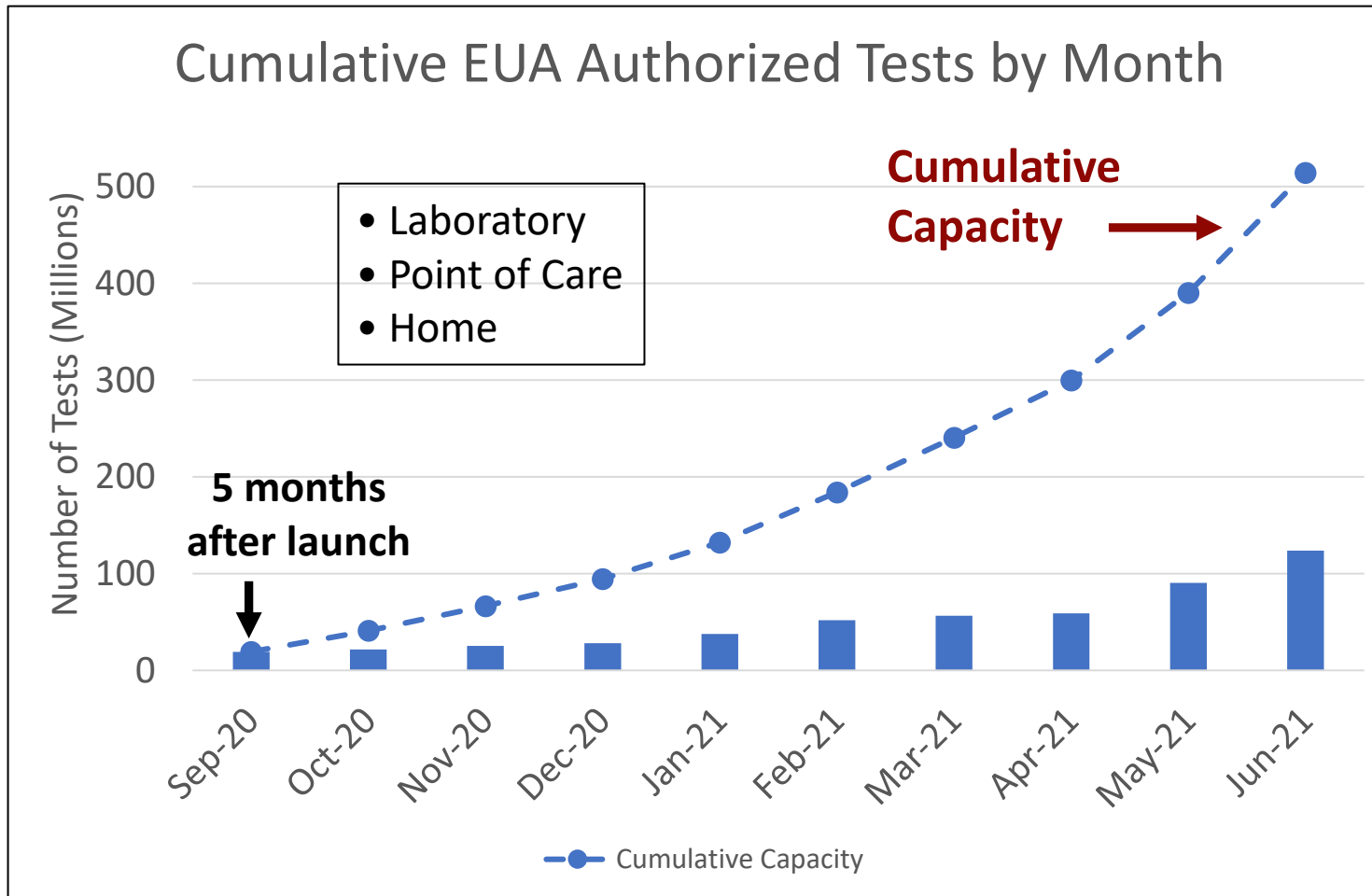
Tech

Labs

Home Rx & OTC

Home OTC

RADx Impact thru June 2021



Major Milestones

- **514 million capacity thru June 2021**
- **~4 M tests and products/day June 2021**
- **27 EUAs; 1st OTC EUA, 2 “at home”**
- **>100 companies supported**

~\$1.1 Billion: Special Congress Authorization
~1.3 Billion: Private Capital Raised

<https://www.nibib.nih.gov/covid-19/radx-tech-program/radx-tech-dashboard>

2 million free home tests

Pitt Co, NC; Hamilton Co, TN;
Washtenaw Co, MI

Assess *efficacy* and *effectiveness*
of at-home testing 2-3 X/week

Outcome measures:

- SARS-CoV-2 prevalence and incidence
- % test positivity, volume
- Cell phone mobility
- Wastewater surveillance

Optional app used for:

- Ordering tests (partnership with Amazon)
- Reminders and instructions
- Interpretation & guidance when positive
- Reporting results to the state (MI, TN)



<https://www.nih.gov/news-events/news-releases/cdc-nih-bring-covid-19-self-testing-residents-two-locales>



SAY YES! COVID TEST

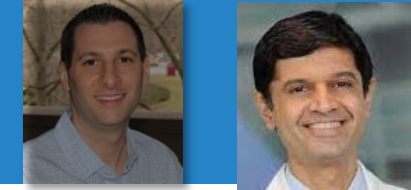
JOIN THE FREE AT-HOME TESTING CHALLENGE



RADx UP

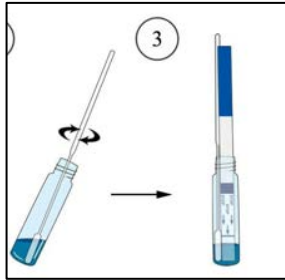


Digital Health Infrastructure

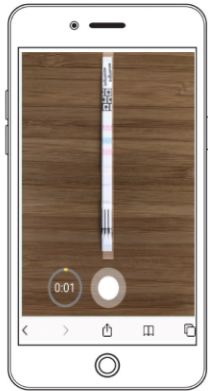


Andrew Weitz Krishna Juluru

RADx POC Test

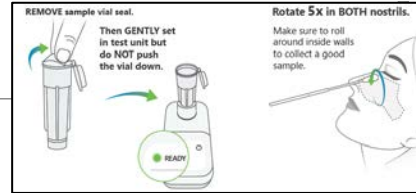


LFA

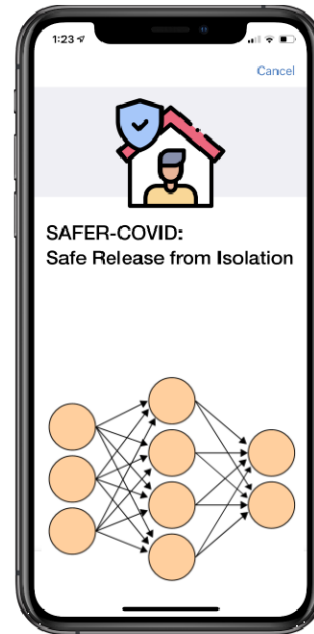
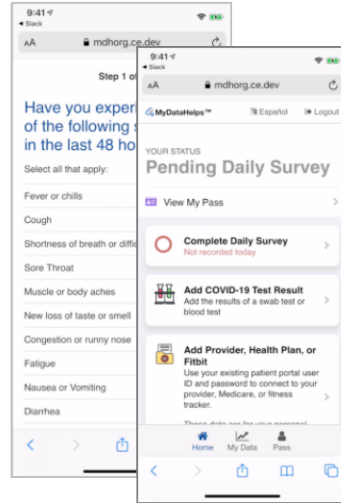


Cell
Phone
Reader

How to Use



Symptom Surveys



EHR & Claims

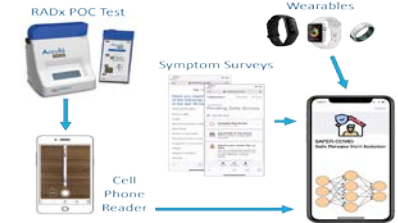


State and Federal



Need
Standards

Contact Tracing



Health
status

e.g. VCI

Need
Standards



Data Hubs
e.g. APHL

<https://vaccinationcredential.org>

RADx Variant Task Force

RADx Team

Richard Creager
Eric Lai

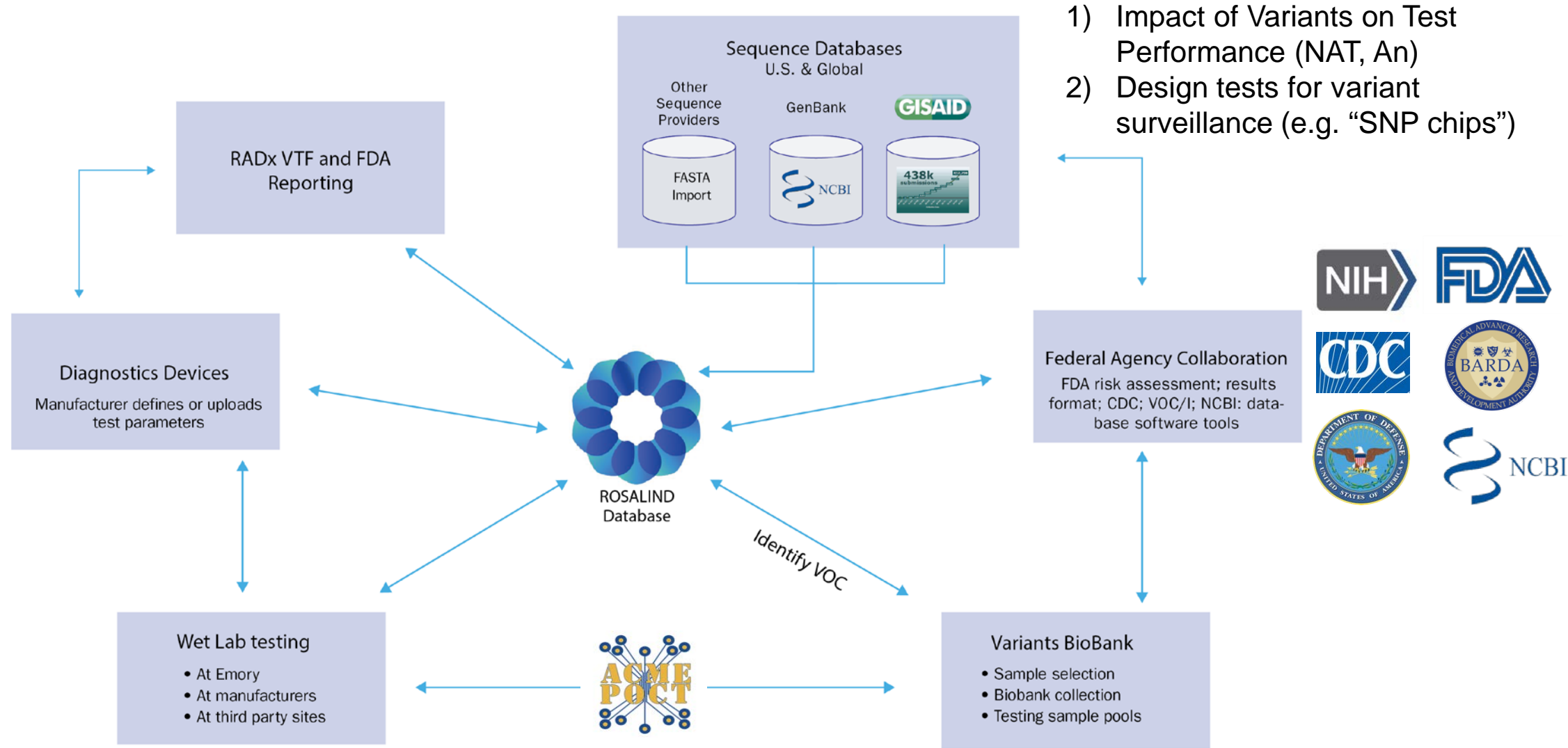
John Blackwood
Mia Cirrincione
Dale Gort
Emily Kennedy
D'lynne Plummer
Thomas Pribyl
Adam Samuta
Megan Shaw
Brian Walsh

Emory

Leda Bassit
Filipp Frank
Morgan Greanleaf
Wilbur Lam
Cangyuan Li
Eric Ortlund
Anuradha Rao
Raymond Schinazi
Allie Suessmith
Julie Sullivan
Thomas Vanderford

Univ of WA

Alex Greninger



RADx Tech Future Directions

Lab RTPCR



ABL 7500

POC RTPCR



Mesa BioTech

POC An (LFA/reader)

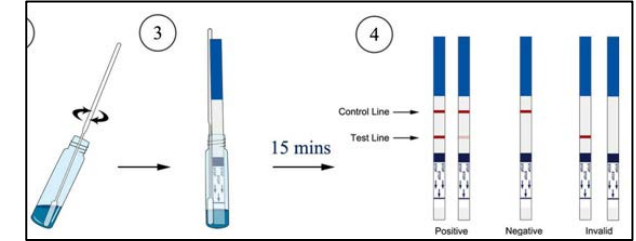


Quidel Sophia



Ellume

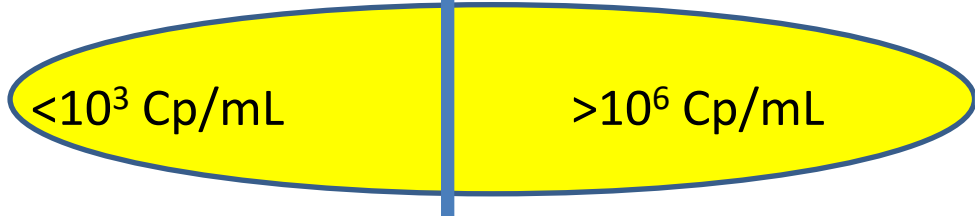
POC An (LFA/visual)



Dipstick LFA

Tech to Bridge the Gap?

Cost	\$\$\$\$	\$\$\$	\$\$	\$
Speed	hours	~30 min	<15 min	
Sens/Spec	>90/95	>90/95	>90/95	
LOD	<10 ³ Cp/mL	<10 ³ Cp/mL	>10 ⁶ Cp/mL	



RADx Tech Future Directions

POC RTPCR



Visby Medical



Mesa BioTech

POC An (LFA/reader)

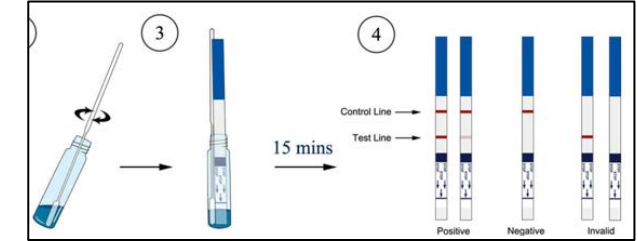


Quidel Sophia



Ellume

POC An (LFA/visual)



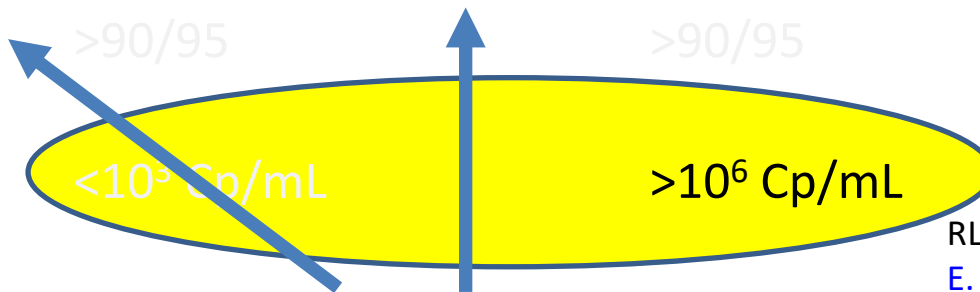
Dipstick LFA

1) New Technology

- Microfluidics
- Nanomaterials
- Single Molecule
- ASICs
- Waveguides
- Photonics

2) New Guidance, FDA Authorizations

- **Screening:** Multiple LFA, e.g. every 2-3 days >95% sensitivity (same as RTPCR)
- **Pool POC RTPCR:** "social pod", e.g. up to 10 in classroom, home, etc.
- **Pediatric self-swabbing:** optimize work flow, e.g. home, schools



RL Smith et al, JID, June 2021. DOI:10.1093/jid/jiab337

[E. Burke, medrxiv.org/cgi/content/short/2021.03.24.21254230v1](https://www.medrxiv.org/content/short/2021.03.24.21254230v1)

Summary

RADx: New process for acceleration and impact

- Leverage existing NIBIB network w/added capabilities for evaluation, validation, funding
- Connect with USG partners to guide regulatory, policy, supply, markets, manufacturing

Technology Needs Change with ↑Vaccination and ↑Variants

- More sensitive, accessible OTC/POC tests; Multiplex w/other pathogens, expand digital health/reporting
- Rapid variant assessment, layered surveillance: *bioinformatics, NGS, SNP chips, POC*

Future: *Leverage RADx process and tech for other pathogens, preparedness*



3 weeks, June 2021

104 applications
34 “Shark Tank”



EMORY
UNIVERSITY



Children's
Healthcare of Atlanta



Multidisciplinary assessment of the Abbott BinaxNOW SARS-CoV-2 point-of-care antigen test in the context of emerging viral variants and self-administration

Jennifer K. Frediani^{1,2,13}, Joshua M. Levy^{2,3,13}, Anuradha Rao^{2,4}, Leda Bassit^{2,5}, Janet Figueroa^{2,4}, Miriam B. Vos^{2,4,6}, Anna Wood^{2,4}, Robert Jerris^{2,6,7}, Van Leung-Pineda^{2,6,7}, Mark D. Gonzalez^{2,6,7}, Beverly B. Rogers^{2,6,7}, Maud Mavigner^{2,4}, Raymond F. Schinazi^{2,4}, Nils Schoof^{2,4}, Jesse J. Waggoner^{2,8,9}, Russell R. Kempker^{2,8}, Paulina A. Rebolledo^{2,8,9}, Jared W. O'Neal^{2,8}, Cheryl Stone^{2,6}, Ann Chahroudi^{2,4,6}, Claudia R. Morris^{2,4,6}, Allie Suessmith^{2,4}, Julie Sullivan^{2,4}, Sarah Farmer^{2,10}, Amanda Foster^{2,10}, John D. Roback^{2,7}, Thanuja Ramachandra^{2,8}, CaDeidre Washington^{2,8}, Kristie Le², Maria C. Cordero^{2,4}, Annette Esper^{2,8}, Eric J. Nehl^{2,9}, Yun F. Wang^{2,7}, Erika A. Tyburski^{2,10}, Greg S. Martin^{2,8} & Wilbur A. Lam^{2,7,11,12}

THE NIBIB'S POINT-OF-CARE TECHNOLOGIES RESEARCH NETWORK (POCTRN)

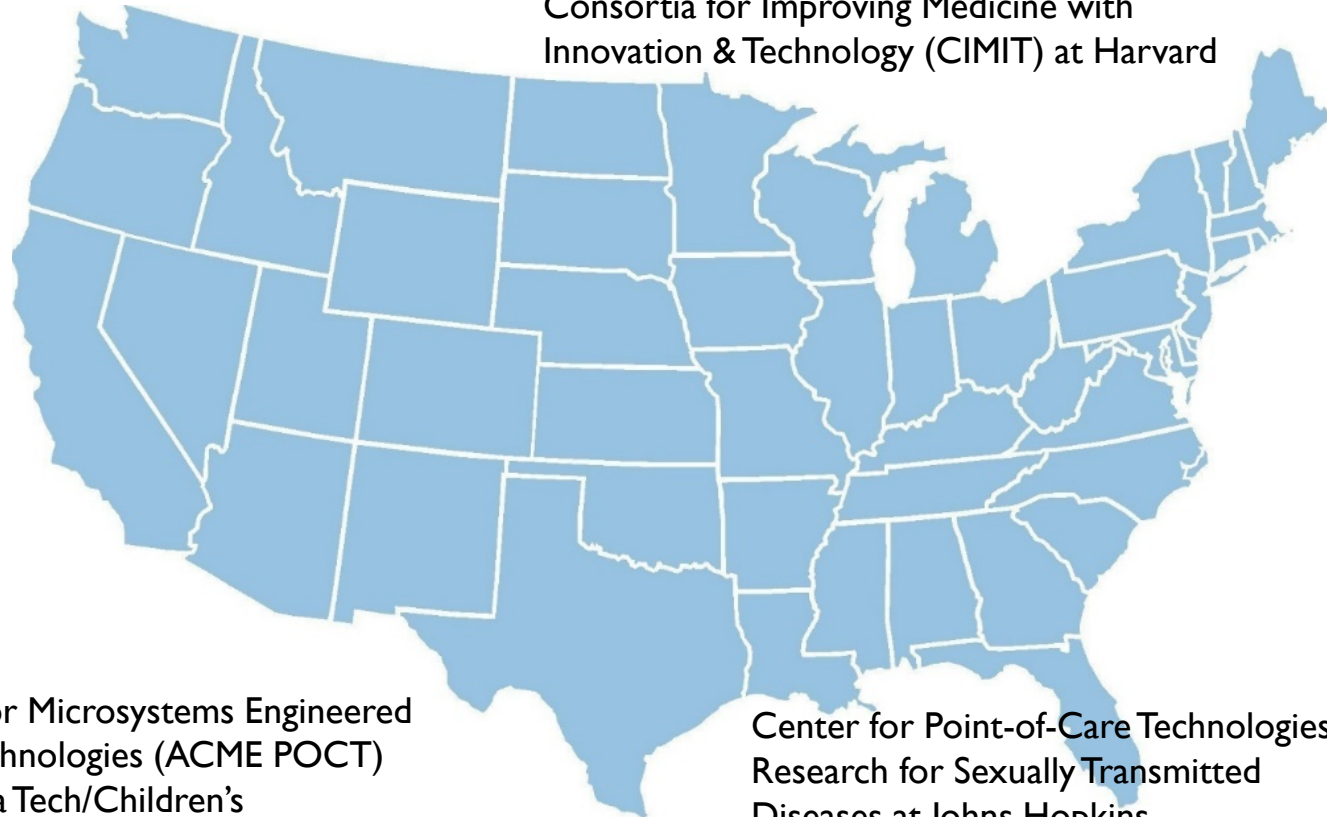
NIH U54-funded Centers that foster the development, clinical assessment, and commercialization of point-of-care (POC) diagnostics across the US

The Center for Advancing Point of Care in Heart, Lung, Blood and Sleep Diseases (CAPCAT) at U Mass

The Center for Innovation in Point of Care Technologies for HIV/AIDS at Northwestern

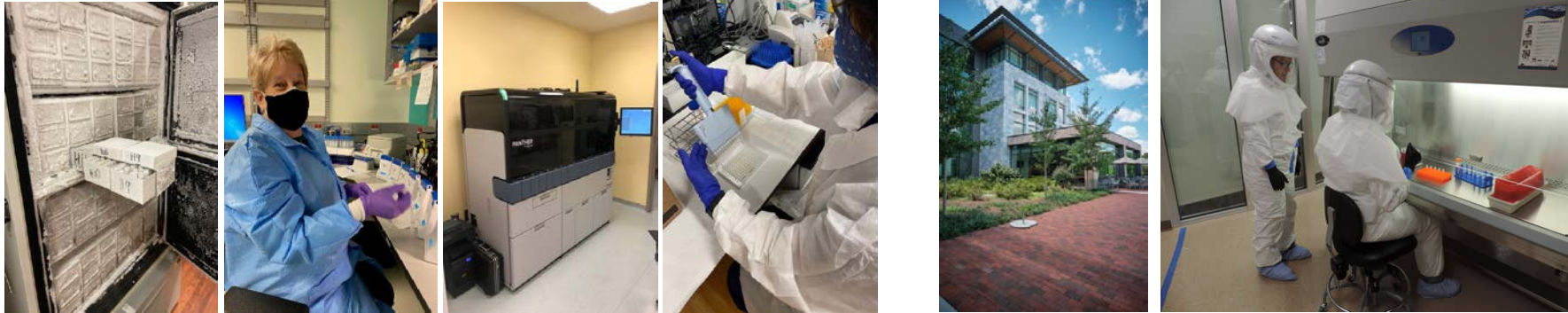
Atlanta Center for Microsystems Engineered Point-of-Care Technologies (ACME POCT) at Emory/Georgia Tech/Children's

Consortia for Improving Medicine with Innovation & Technology (CIMIT) at Harvard



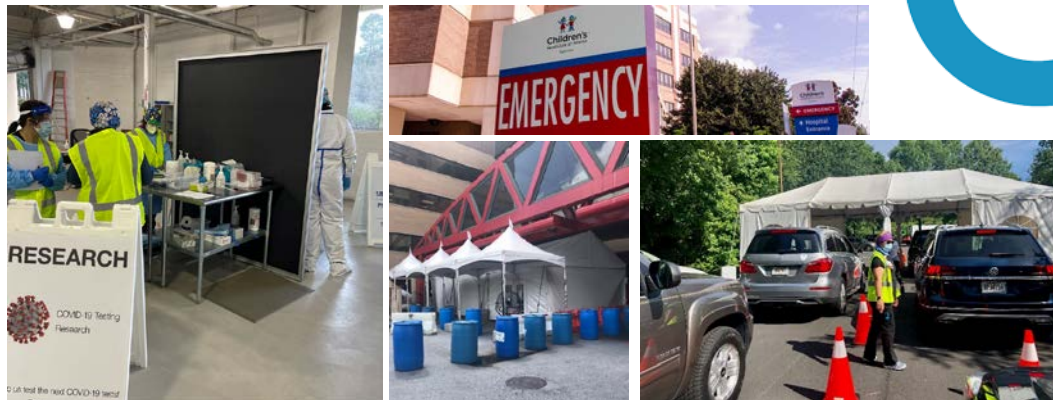
Center for Point-of-Care Technologies Research for Sexually Transmitted Diseases at Johns Hopkins

How Do We “Test The Tests?”



Our Emory and Children’s Healthcare of Atlanta pathologists and their clinical laboratories, and their biorepositories

Our Emory Biosafety Level-3 (BSL-3) laboratories and virologists



Our prospective pediatric and adult specimen collection at drive thru, community, healthcare worker, and student/faculty sites and hospital inpatient wards and emergency rooms

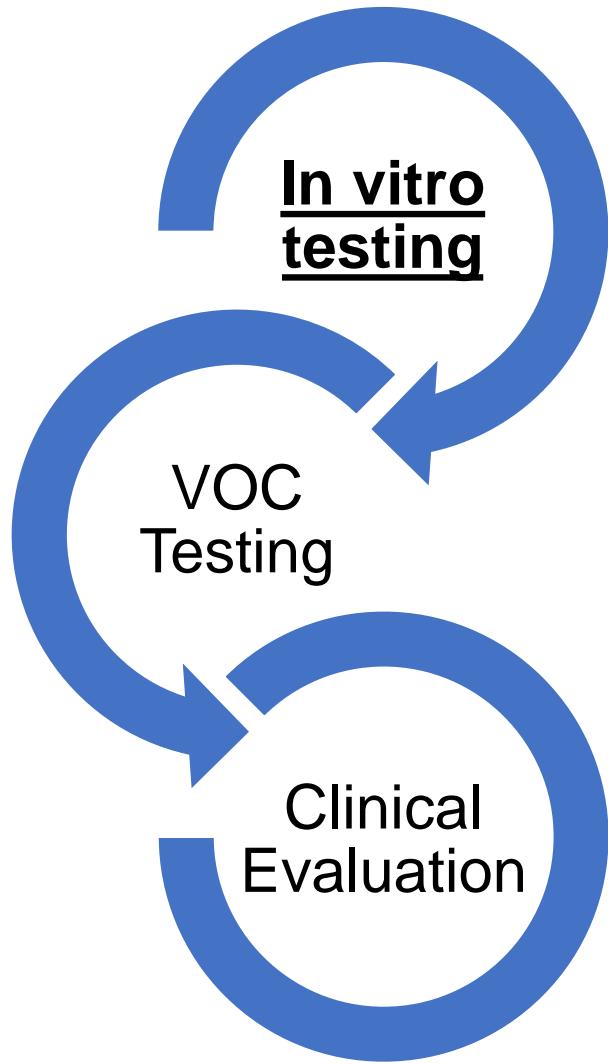


Our engineers and staff at Georgia Tech’s Institute for Electronics and Nanotechnology and HomeLab

Abbott BinaxNOW COVID-19 Antigen test



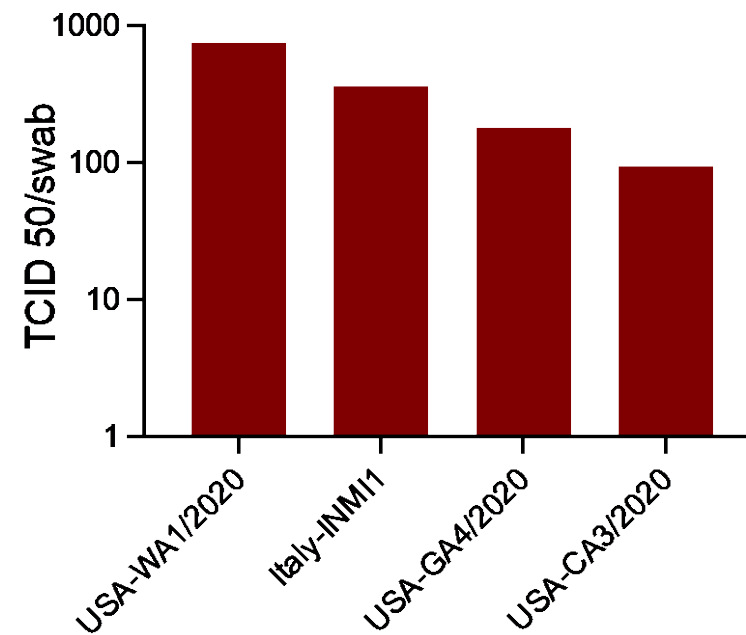
- Rapidly diagnosing highly transmittable variants of concern (VOC) of SARS CoV-2 using accurate tests can prevent spread of VOC
- BinaxNOW is a qualitative, SARS-CoV-2 diagnostic assay that detects the viral nucleocapsid (N) protein from anterior nasal swabs
- BinaxNOW, was the first LFA to receive a FDA Emergency Use Authorization (EUA) for the home setting
- Here, we summarize an assessment of the BinaxNOW test in the context of its ability to detect VOC, and in self administration of tests



LOD: serial dilutions of live SARS-CoV-2 and testing in Emory BSL3 lab

Limit Of Detection- SARS-CoV-2 Live Virus (WT Virus, 4 isolates)

Viral dilution tested		Positive results/replicates			
TCID ₅₀ /ml	TCID ₅₀ /Swab (20 _α d)	USA-WA1/2020	USA-CA3/2020	Italy-INMI1	USA-GA4/2020
7.5x10 ⁵	1.5x10 ⁴	3/3	n.t.	n.t.	n.t.
7.5x10 ⁴	1.5x10 ³	5/5	3/3	3/3	3/3
3.8x10 ⁴	7.5x10 ²	5/5	3/3	3/3	3/3
1.9x10 ⁴	3.6x10 ²	0/5	3/3	2/3	3/3
9.4x10 ³	1.8x10 ²	n.t.	3/3	0/3	2/3
4.7x10 ³	9.4x10 ¹	n.t.	3/3	n.t.	0/3
2.3x10 ³	4.5x10 ¹	n.t.	0/3	n.t.	n.t.



The LoD of BinaxNOW varied from 750 to 94 TCID₅₀/swab, depending on the isolate

(TCID₅₀: 50% tissue culture infectivity dose)

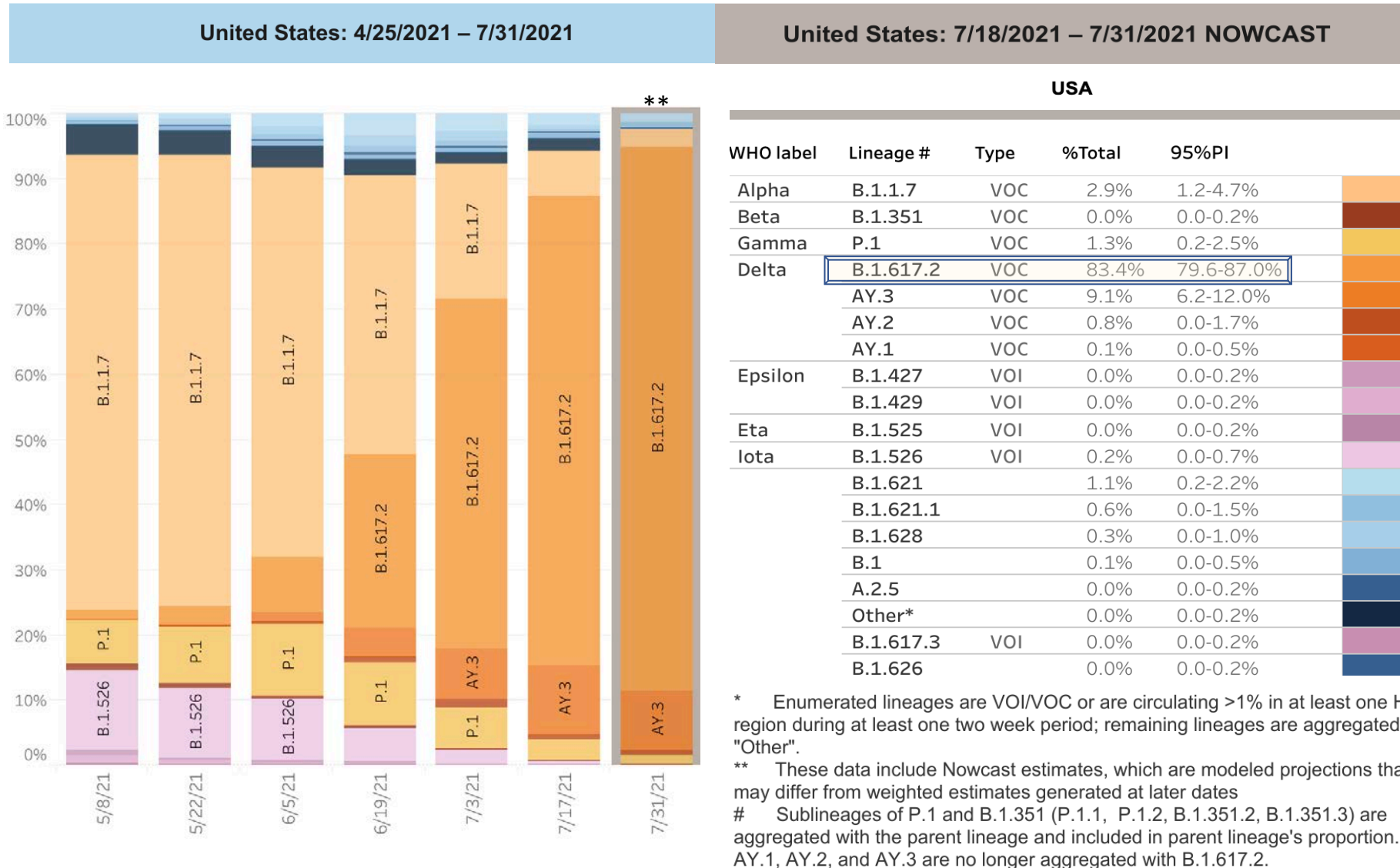


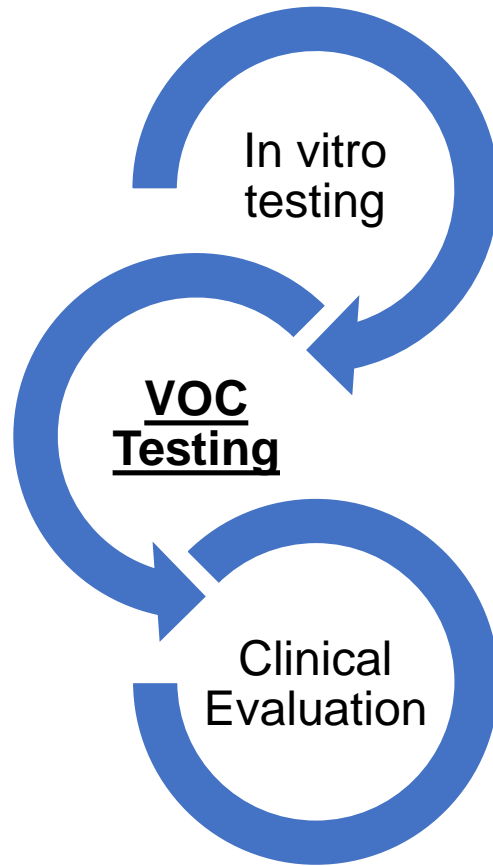
Children's
Healthcare of Atlanta



EMORY
UNIVERSITY

CDC-Estimated Proportions of SARS-CoV-2 Lineages





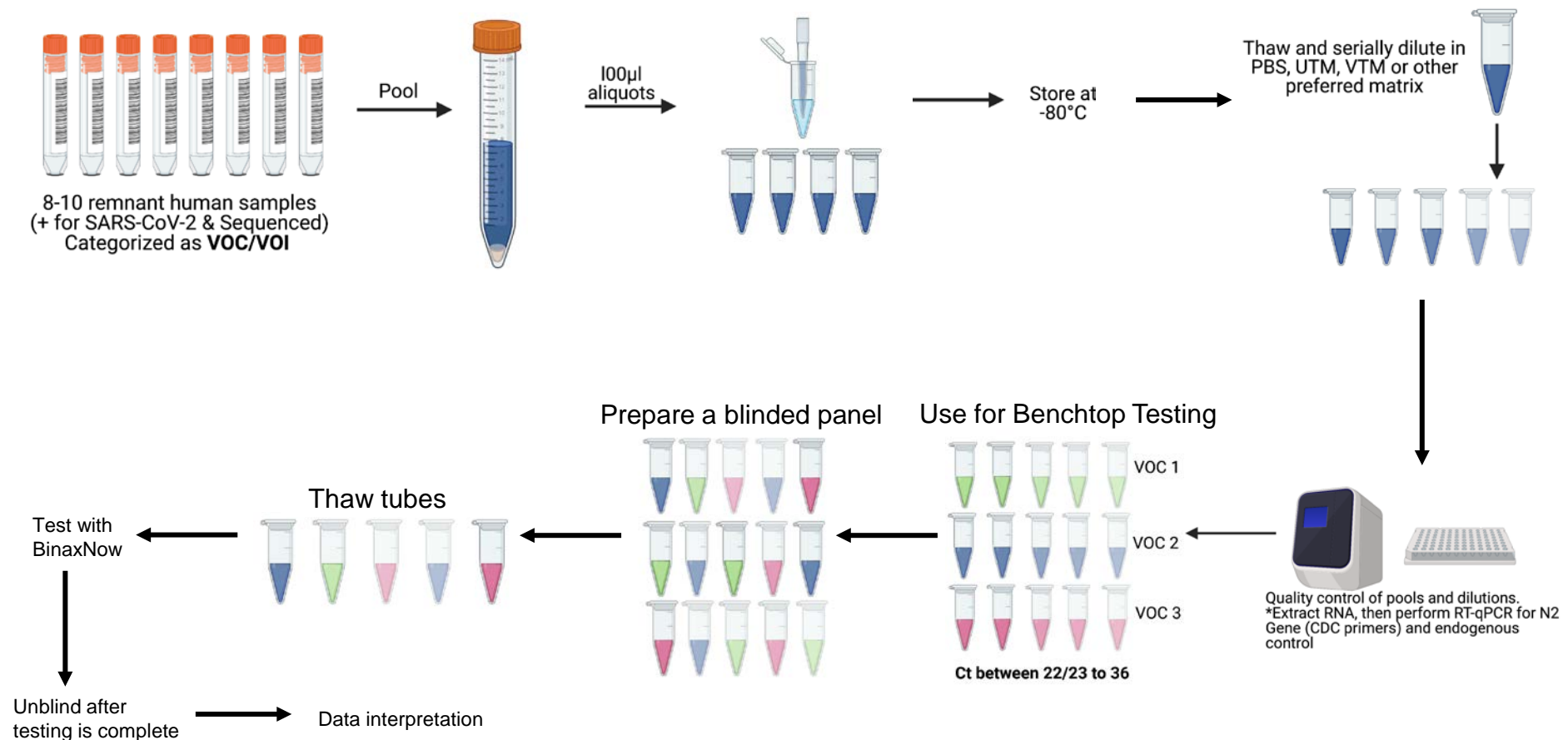
Emory is part of the NIH-RADx-VTF program

- Large biobank of remnant SARS-CoV-2 clinical samples (RCS)
- >5,000 VOC/I

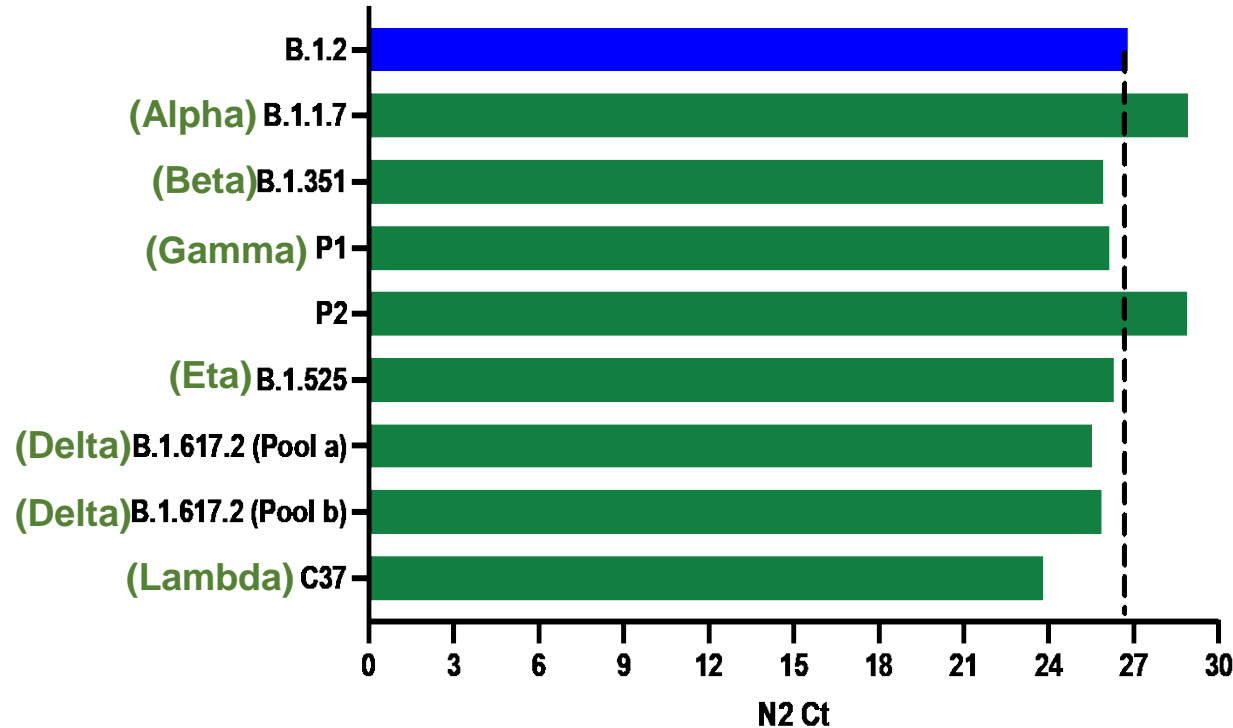
Create panels with RCS to test the ability of diagnostic tests to accurately detect the VOC/I

Evaluate sensitivity of BinaxNOW to detect Delta (B.1.617.2), Lambda (C37), and other VOC

Sample Pooling, Panel Creation and Testing of VOC/I using RCS



Ability of Abbott BinaxNOW COVID-19 Ag card to detect VOC using pools of remnant clinical samples

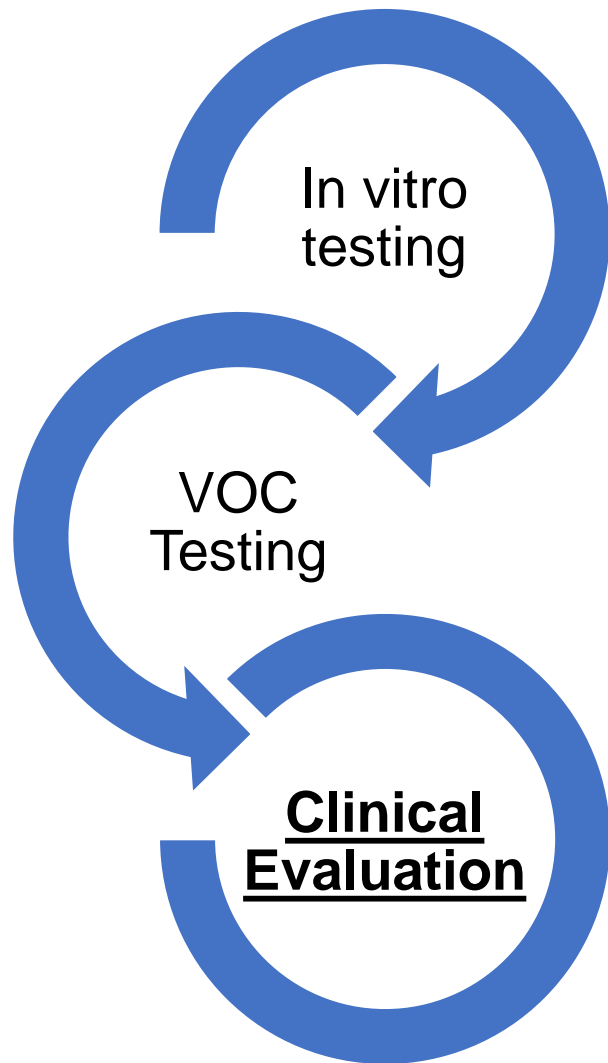


Lineage	Highest Detected Pool N2 Ct	BinaxNOW Result
B.1.2	26.79	Positive
B.1.1.7	28.90	Positive
B.1.351	25.92	Positive
P.1	26.14	Positive
P.2	28.89	Positive
B.1.525	26.28	Positive
B.1.617.2 (Pool A)	25.52	Positive
B.1.617.2 (Pool B)	25.87	Positive
C37	23.81	Positive

	N Protein Mutations			
Delta (Pool a)	D63G	R203M	-	D377Y
Delta (Pool b)	D63G	R203M	G215C	D377Y

All VOC pools are detected with equivalent sensitivity to non-VOC B.1.2

***Unpublished data**



309 participants recruited from RADx testing centers (Nov 2020 – Jan 2021)

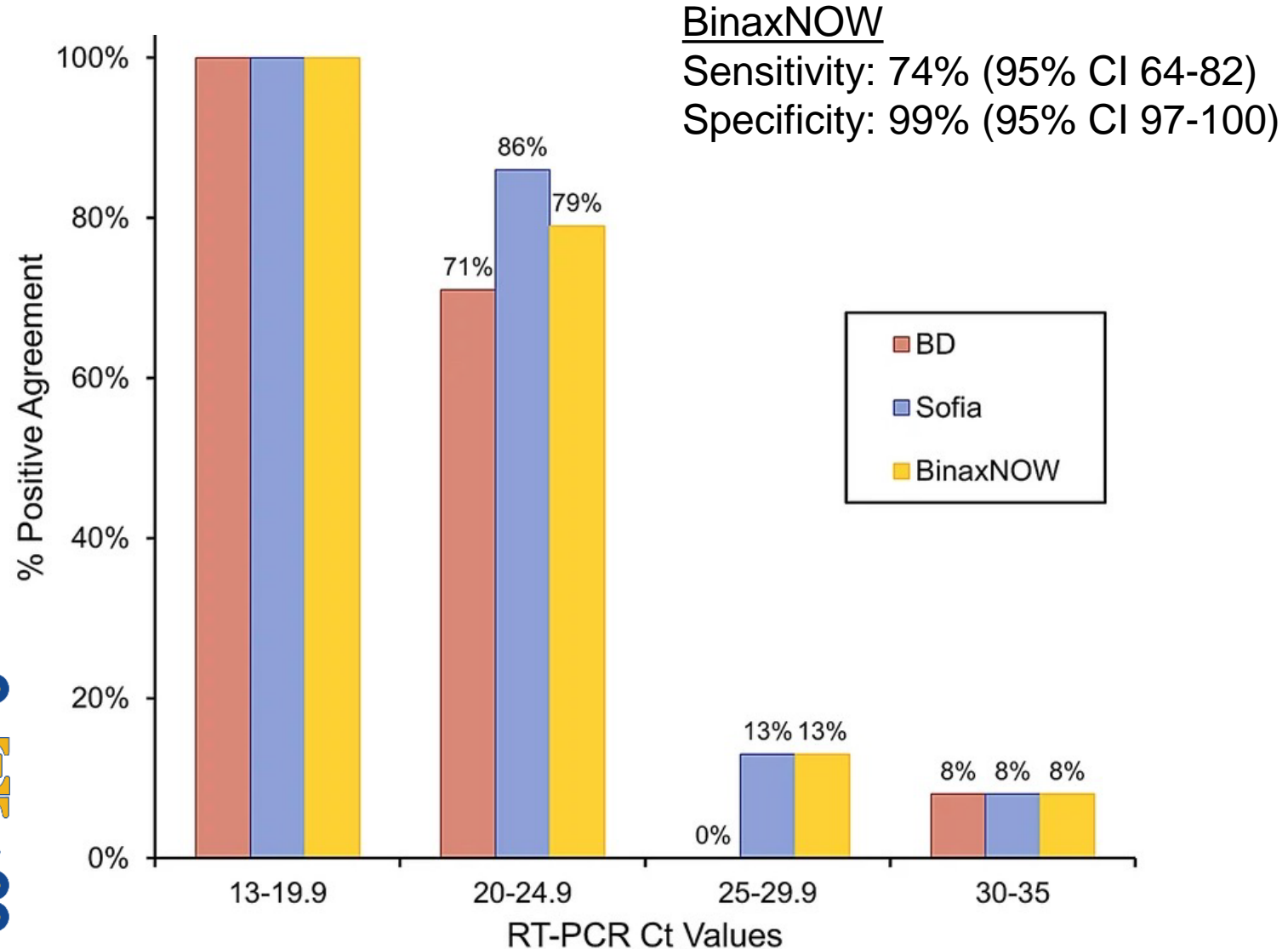
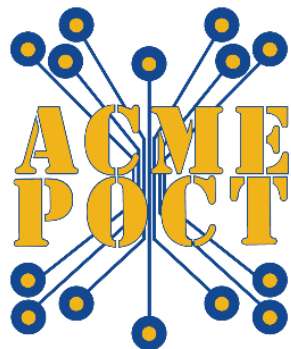
Age ≥ 7 years with symptoms < 7 days

SOC NP RT-PCR within 24 hours

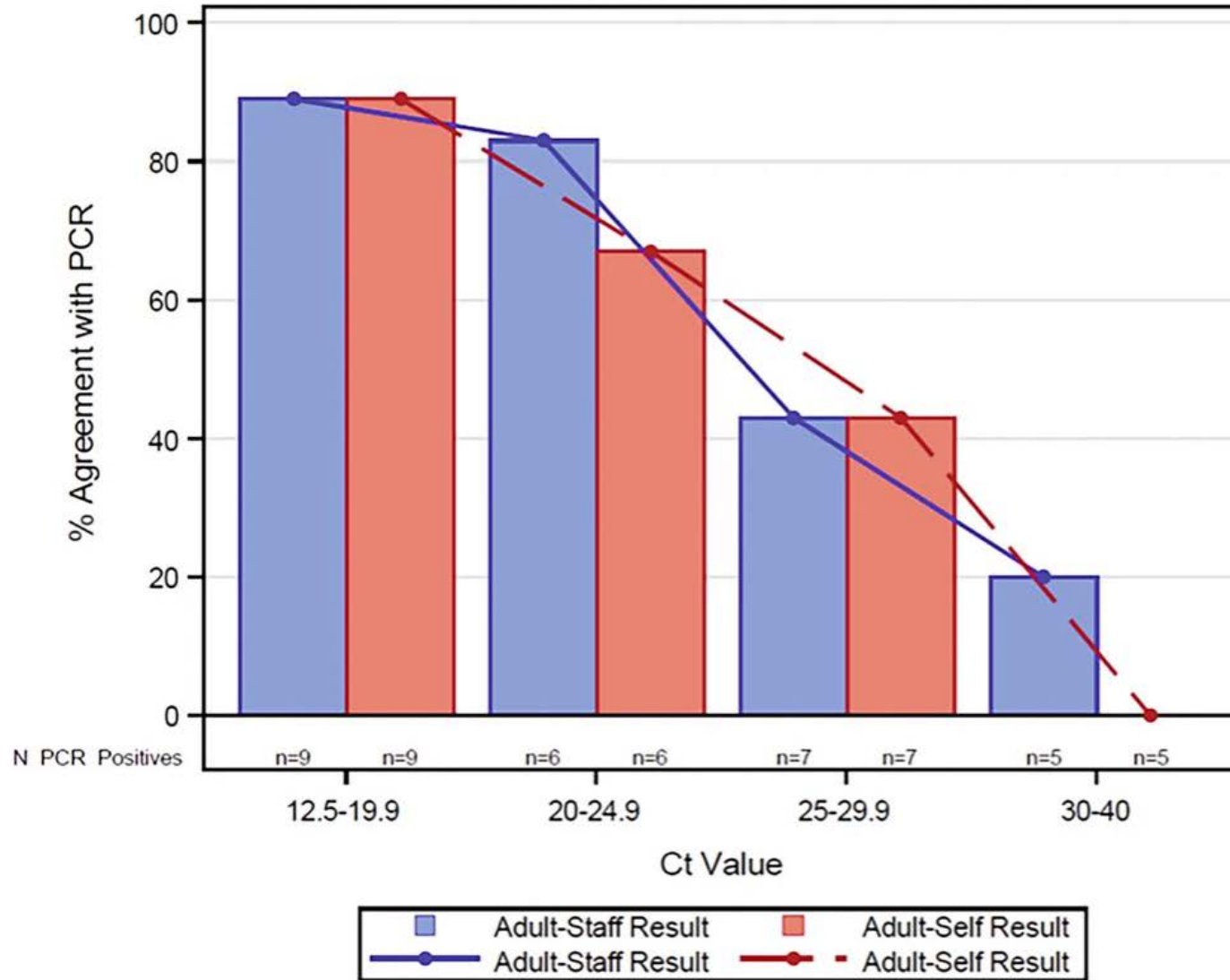
- Cobas 6800
- Abbott Alinity
- Panther Fusion

Structured usability assessment

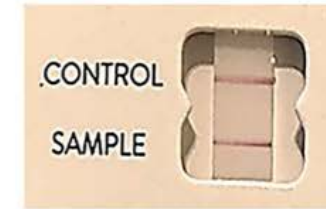
Concordance of Antigen Assays vs. RT-PCR



BinaxNOW % Agreement with PCR by Ct Value Staff vs Self-Collection



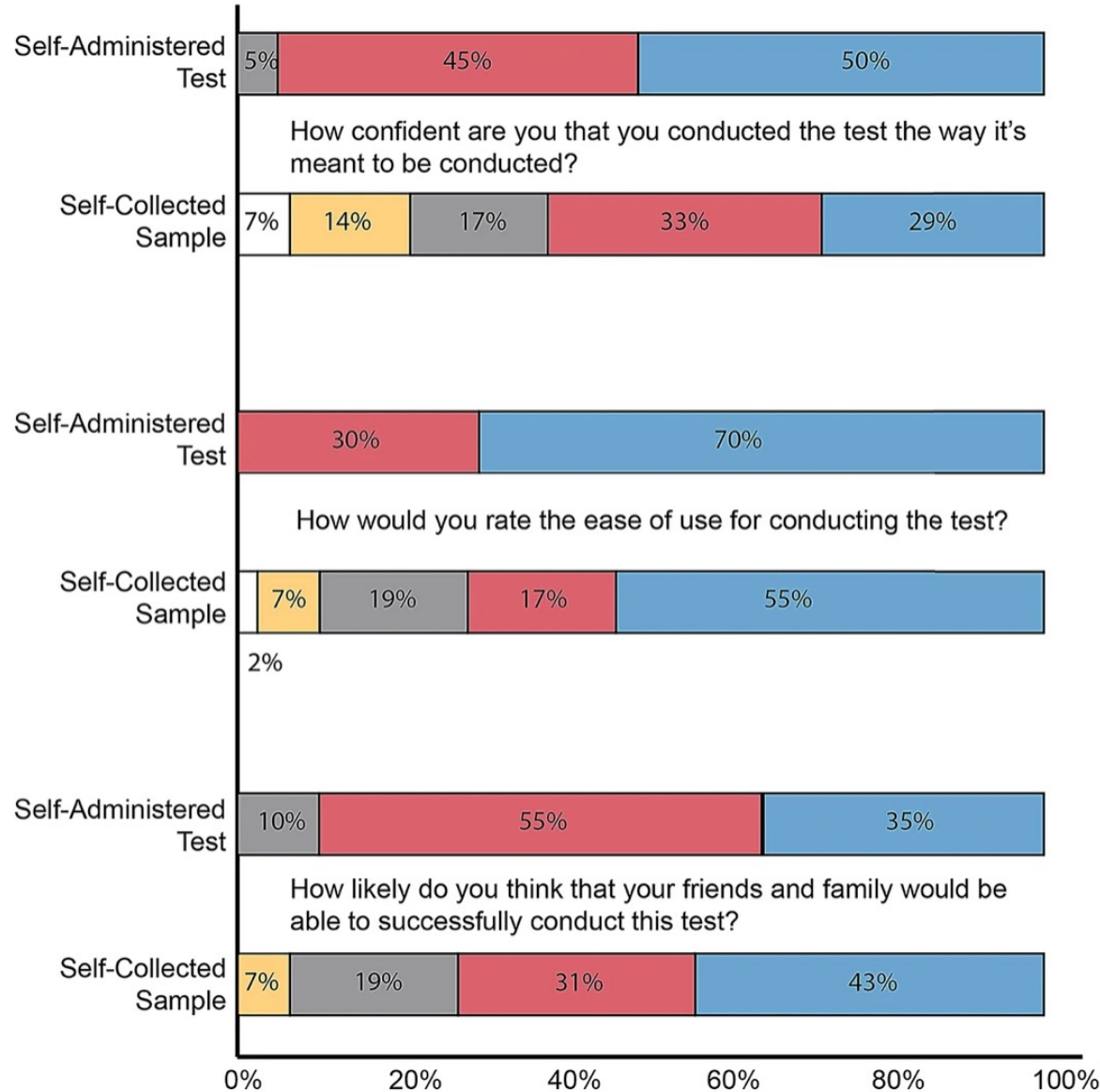
Binax-CoV2
Positive



Binax-CoV2
Negative



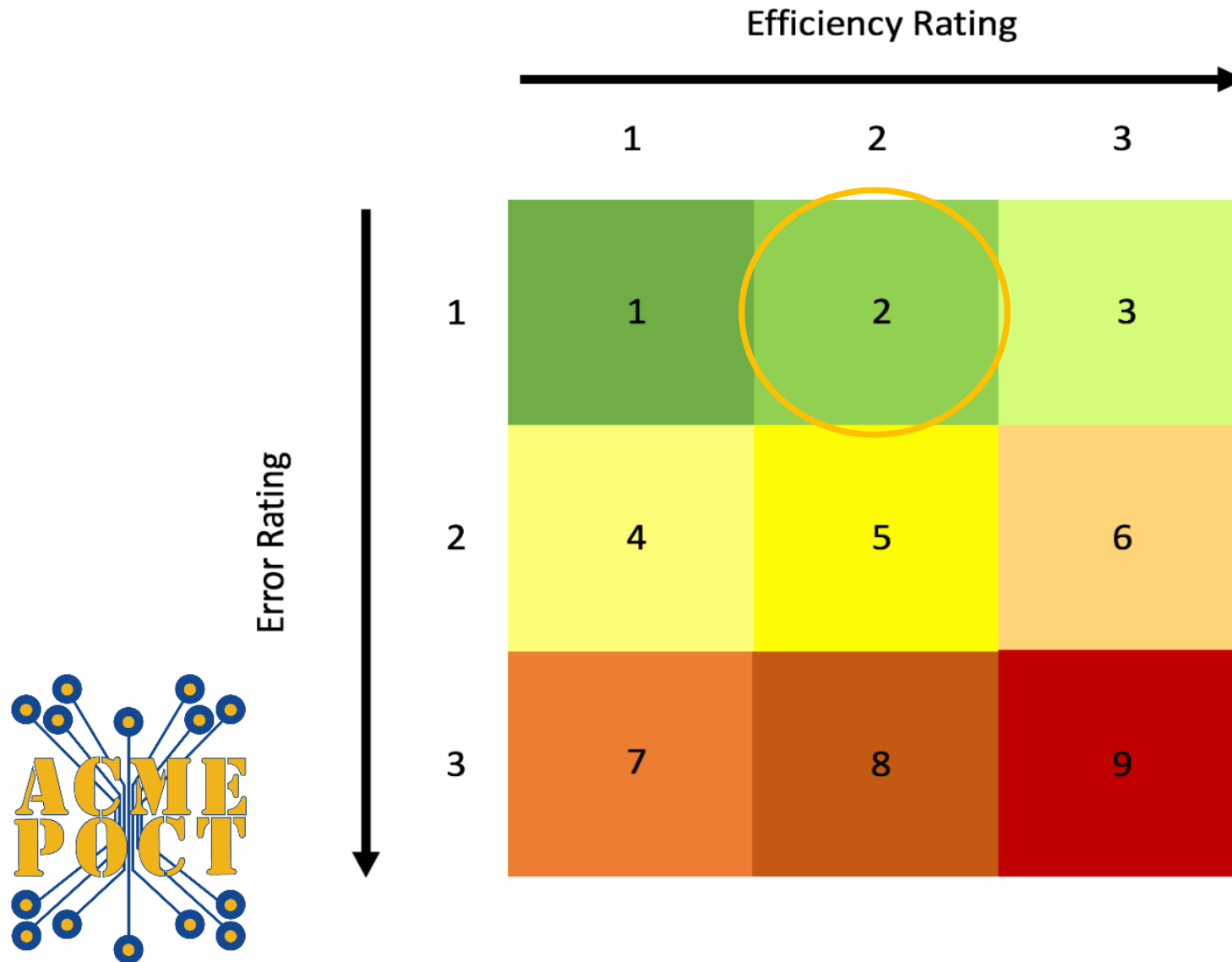
Evaluation for the independent use of BinaxNOW



Caregiver: n = 17
 Adolescent: n = 3
 Adult: n = 42

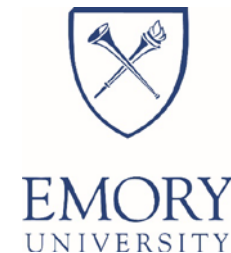
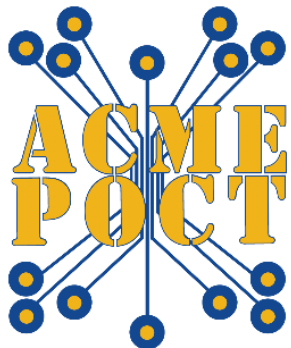
Sensitivity: 57%
 (95% CI 37-76)
 Specificity: 100%
 (95% CI 79-100)

Usability Rating for BinaxNOW



Conclusions

- Antigen tests have lower sensitivities compared to RT-PCR, especially with increasing Ct values
- Sensitivity may decrease even more due to user error once moved to home tests
- BinaxNOW accurately detects new viral variants



Acknowledgements

Abbott BinaxNOW™ COVID-19 Ag Cards were graciously provided by Brett P. Giroir of the U.S. Department of Health and Human Services and Bruce J. Tromberg of the National Institute of Biomedical Imaging and Bioengineering of the NIH.

The following reagents were deposited by the Centers for Disease Control and Prevention and obtained through BEI Resources, NIAID, NIH: SARS-Related Coronavirus 2, Isolate USA-WA1/2020, NR-52281, Isolate USA-CA2/2020, NR-52387.

The following reagent was deposited by Dr. Maria R. Capobianchi for distribution through BEI Resources, NIAID, NIH: SARS-Related Coronavirus 2, Isolate Italy-INMI1, NR-52284.

We thank the RADx Variant Task Force team (Richard S. Creager, Eric Lai, John Blackwood, Thomas Pribyl, Filipp Frank, Eric Ortlund, Alexander L. Greninger, Mia Cirrincione, Dale Gort, Emily B. Kennedy, Adam Samuta, Megan Shaw, Brian Walsh) Emory University: Morgan Greenleaf, Thomas Vanderford, Nils Schoof, Maud Mavigner, Raymond Schinazi, who made the evaluation of BinaxNow test against the variants possible, and Helix, San Mateo, CA (Marc Laurent, Nicole Washington, William Lee, and Jimmy Ramirez) for providing the remnant clinical samples.



Children's
Healthcare of Atlanta



EMORY
UNIVERSITY

CDC Social Media

<https://www.facebook.com/CDC>



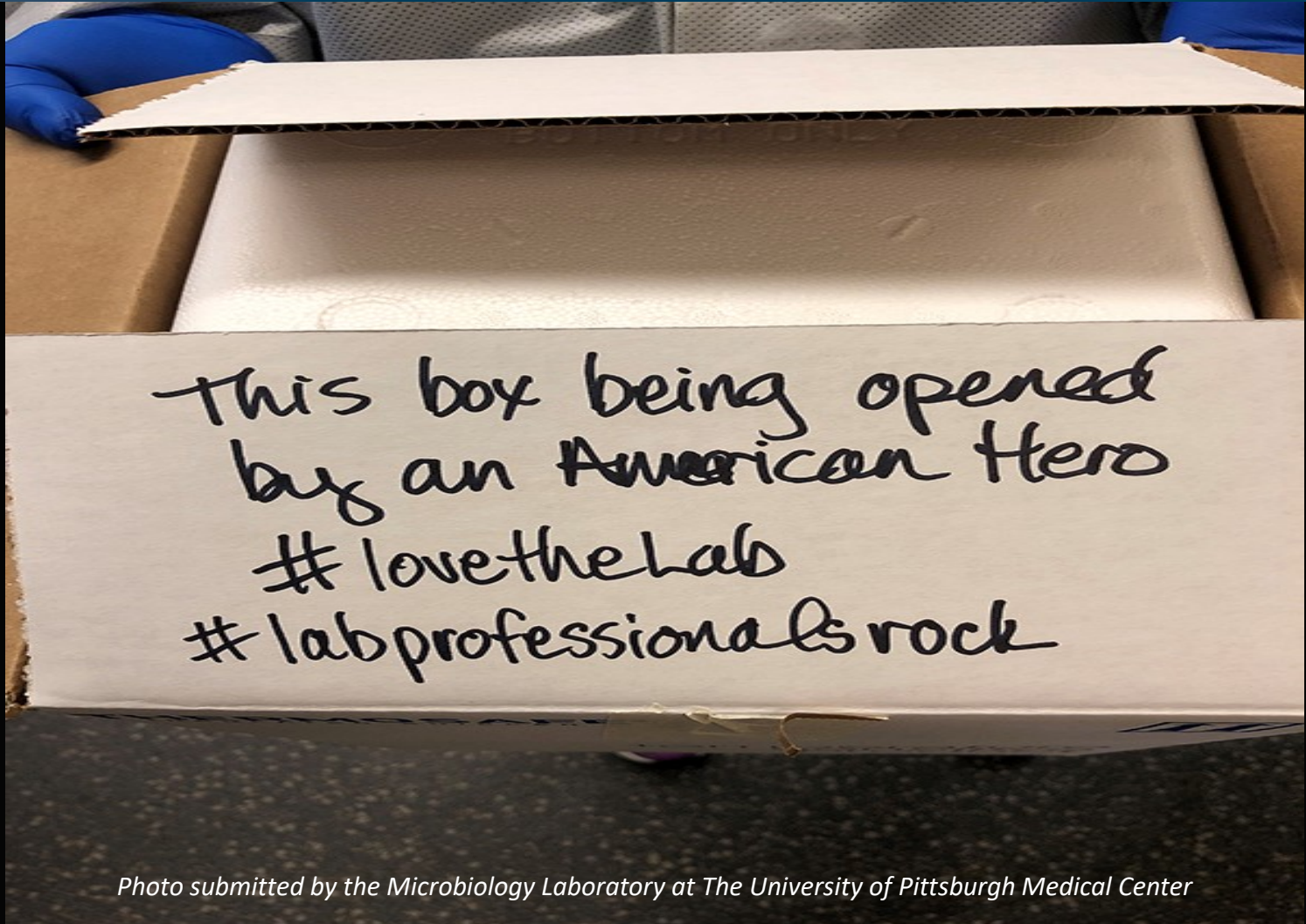
<https://twitter.com/cdcgov>

<https://www.instagram.com/cdcgov>



<https://www.linkedin.com/company/cdc>

Thank You For Your Time!



This box being opened
by an American Hero
#lovethelab
#labprofessionalsrock

Photo submitted by the Microbiology Laboratory at The University of Pittsburgh Medical Center