

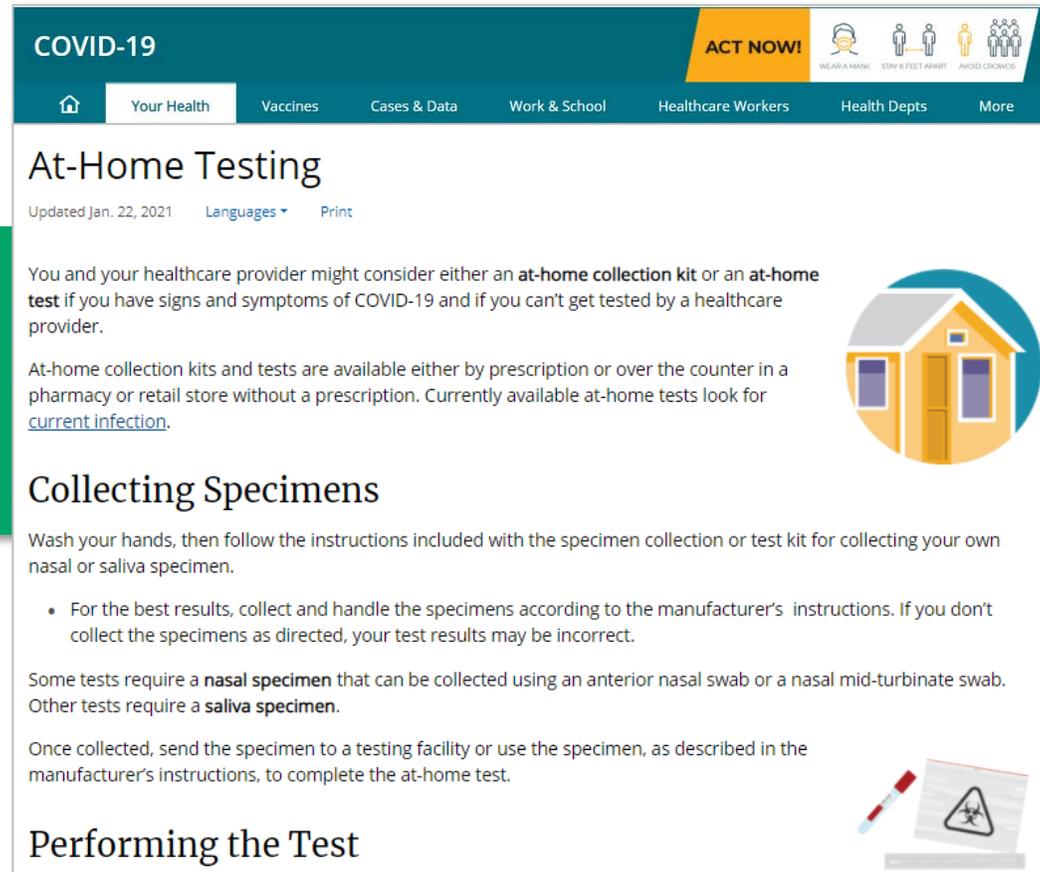
# Clinical Laboratory COVID-19 Response Call

Monday, January 25<sup>th</sup>, 2021 at 3:00 PM ET

- **Welcome**
  - Jasmine Chaitram, CDC Division of Laboratory Systems (DLS)
- **What Are the Clinical Laboratory Result Abnormalities in Patients Hospitalized with COVID-19?**
  - Nadia Ayala-Lopez, Johns Hopkins Medical Institute
- **COVID-19 Variants and Surveillance**
  - Chris Elkins, CDC COVID-19 Laboratory and Testing Task Force
- **CMS Billing Update**
  - Sarah Harding, Centers for Medicare and Medicaid Services (CMS)
- **FDA Update**
  - Tim Stenzel, U.S. Food and Drug Administration (FDA)

# COVID-19 At-Home Testing Webpage

<https://www.cdc.gov/coronavirus/2019-ncov/testing/at-home-testing.html>



The screenshot shows the CDC's COVID-19 At-Home Testing webpage. The header includes the title "COVID-19" and a navigation menu with options like "Your Health", "Vaccines", "Cases & Data", "Work & School", "Healthcare Workers", "Health Depts", and "More". A prominent "ACT NOW!" button is visible, along with icons for "WEAR A MASK", "STAY 6 FEET APART", and "AVOID CROWDS". The main content area is titled "At-Home Testing" and includes a sub-header "Updated Jan. 22, 2021" and options for "Languages" and "Print". The text explains that users and their healthcare providers might consider an at-home collection kit or an at-home test if they have symptoms and cannot be tested by a healthcare provider. It notes that kits and tests are available by prescription or over the counter in pharmacies or retail stores. A section titled "Collecting Specimens" provides instructions on handwashing and handling specimens, with a bulleted list of best practices. It also mentions that some tests require a nasal specimen (collected via anterior nasal swab or nasal mid-turbinate swab) while others require a saliva specimen. The final section, "Performing the Test", instructs users to send the specimen to a testing facility or use the specimen as directed in the manufacturer's instructions. The page features several icons: a house icon for at-home testing, a house icon for collecting specimens, and a biohazard icon for performing the test.

**COVID-19** **ACT NOW!** WEAR A MASK STAY 6 FEET APART AVOID CROWDS

Home Your Health Vaccines Cases & Data Work & School Healthcare Workers Health Depts More

## At-Home Testing

Updated Jan. 22, 2021 Languages Print

You and your healthcare provider might consider either an **at-home collection kit** or an **at-home test** if you have signs and symptoms of COVID-19 and if you can't get tested by a healthcare provider.

At-home collection kits and tests are available either by prescription or over the counter in a pharmacy or retail store without a prescription. Currently available at-home tests look for [current infection](#).

### Collecting Specimens

Wash your hands, then follow the instructions included with the specimen collection or test kit for collecting your own nasal or saliva specimen.

- For the best results, collect and handle the specimens according to the manufacturer's instructions. If you don't collect the specimens as directed, your test results may be incorrect.

Some tests require a **nasal specimen** that can be collected using an anterior nasal swab or a nasal mid-turbinate swab. Other tests require a **saliva specimen**.

Once collected, send the specimen to a testing facility or use the specimen, as described in the manufacturer's instructions, to complete the at-home test.

### Performing the Test

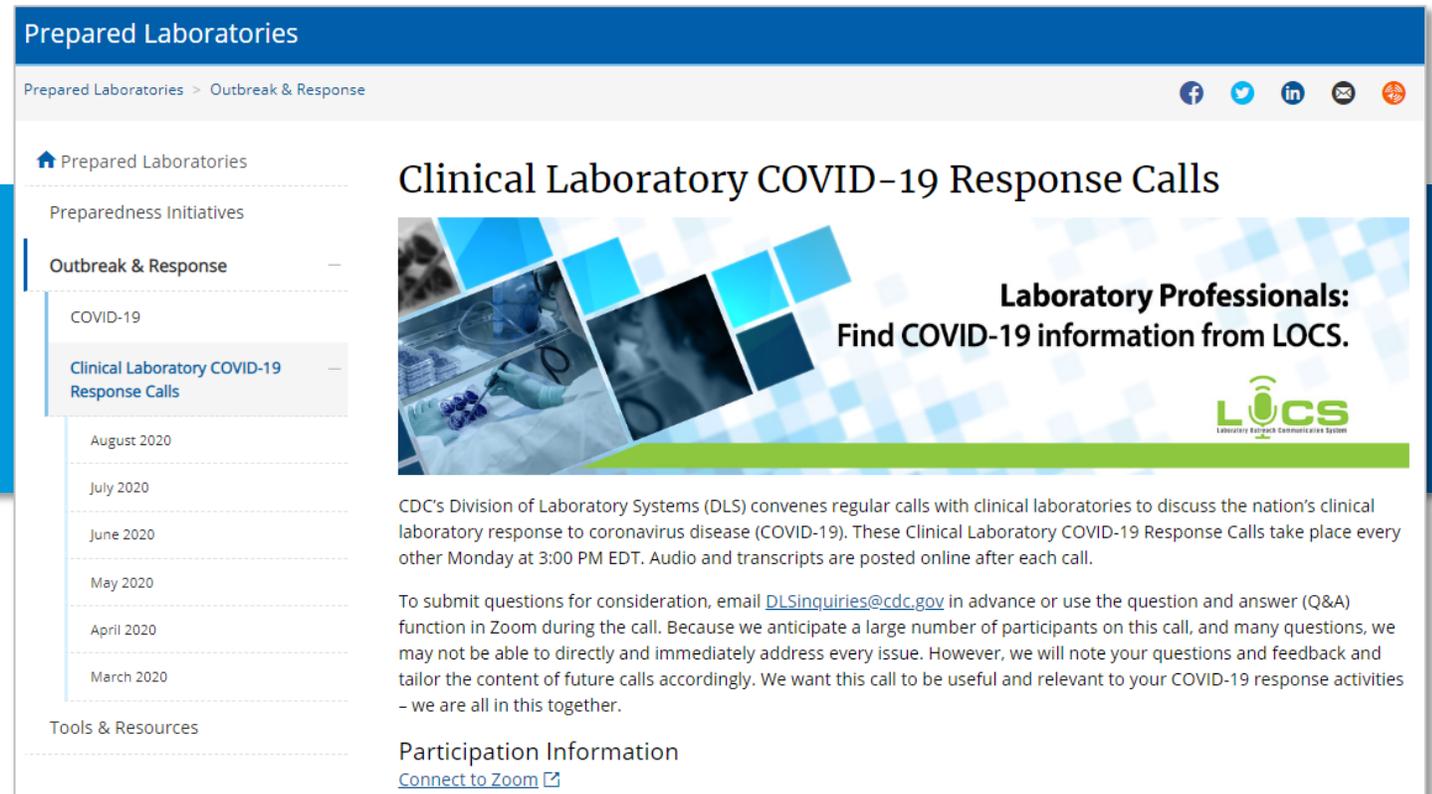
# COVID-19 Resources for Laboratories

- **LOINC In-Vitro Diagnostic (LIVD) Test Code Mapping for SARS-CoV-2 Tests**  
<https://www.cdc.gov/csels/dls/sars-cov-2-livd-codes.html>
- **IVD Industry Connectivity Consortium**  
<https://ivdconnectivity.org/livd/>
- **Antigen Testing Guidance**  
<https://www.cdc.gov/coronavirus/2019-ncov/lab/resources/antigen-tests-guidelines.html>
- **Frequently Asked Questions about COVID-19 for Laboratories**  
<https://www.cdc.gov/coronavirus/2019-ncov/lab/faqs.html>
- **Interim Guidance for Collecting, Handling, and Testing Clinical Specimens**  
<https://www.cdc.gov/coronavirus/2019-ncov/lab/guidelines-clinical-specimens.html>
- **Diagnostic Tools and Virus**  
<https://www.cdc.gov/coronavirus/2019-ncov/lab/tool-virus-requests.html>
- **Emergency Preparedness for Laboratory Personnel**  
<https://emergency.cdc.gov/labissues/index.asp>
- **CDC Laboratory Outreach Communication System (LOCS)**  
<https://www.cdc.gov/csels/dls/locs/>

# 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 website. The main heading is 'Clinical Laboratory COVID-19 Response Calls'. Below the heading is a banner image showing laboratory equipment and a person in a lab coat. To the right of the banner is the text 'Laboratory Professionals: Find COVID-19 information from LOCS.' and the LOCS logo. Below the banner is a paragraph explaining that the CDC's Division of Laboratory Systems (DLS) convenes regular calls with clinical laboratories to discuss the nation's clinical laboratory response to COVID-19. It also provides instructions on how to submit questions for consideration via email or Zoom. At the bottom, there is a 'Participation Information' section with a 'Connect to Zoom' link.

Prepared Laboratories

Prepared Laboratories > Outbreak & Response

Prepared Laboratories

Preparedness Initiatives

Outbreak & Response

COVID-19

Clinical Laboratory COVID-19 Response Calls

August 2020

July 2020

June 2020

May 2020

April 2020

March 2020

Tools & Resources

## Clinical Laboratory COVID-19 Response Calls

**Laboratory Professionals:**  
Find COVID-19 information from LOCS.

LOCS  
Laboratory Outreach Communications System

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 EDT. Audio and transcripts are posted online after each call.

To submit questions for consideration, email [DLInquiries@cdc.gov](mailto:DLInquiries@cdc.gov) in advance or use the question and answer (Q&A) function in Zoom during the call. Because we anticipate a large number of participants on this call, and many questions, we may not be able to directly and immediately address every issue. However, we will note your questions and feedback and tailor the content of future calls accordingly. We want this call to be useful and relevant to your COVID-19 response activities - we are all in this together.

Participation Information  
[Connect to Zoom](#)

# Schedule for Clinical Laboratory COVID-19 Response Calls

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The next call will be on **Monday, February 8<sup>th</sup>**  
from **3:00 PM to 4:00 PM ET**

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# We Want to Hear From You!

## Training and Workforce Development

Questions about education and training?

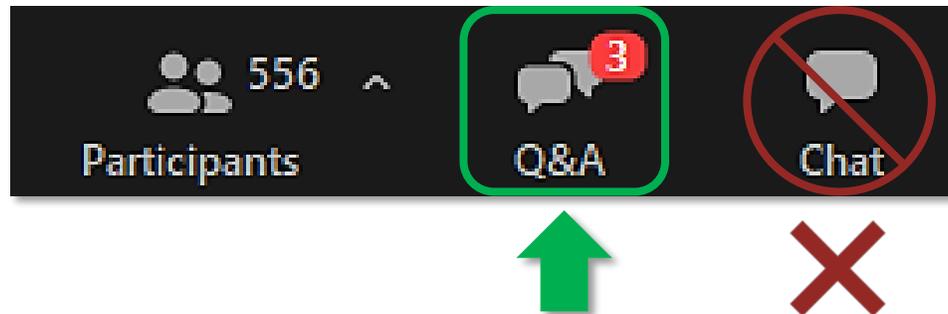
Contact [LabTrainingNeeds@cdc.gov](mailto:LabTrainingNeeds@cdc.gov)



# 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](mailto:media@cdc.gov)
- If you are a patient, please direct any questions to your healthcare provider



# What are the clinical laboratory result abnormalities in patients hospitalized with COVID-19?

Nadia Ayala-Lopez, PhD, MLS (ASCP)

Clinical Chemistry Fellow  
Department of Pathology

# Clinical laboratory hallmarks of severe COVID-19

## Markers of

- Inflammation
- Coagulation
- Tissue injury

# Inflammation

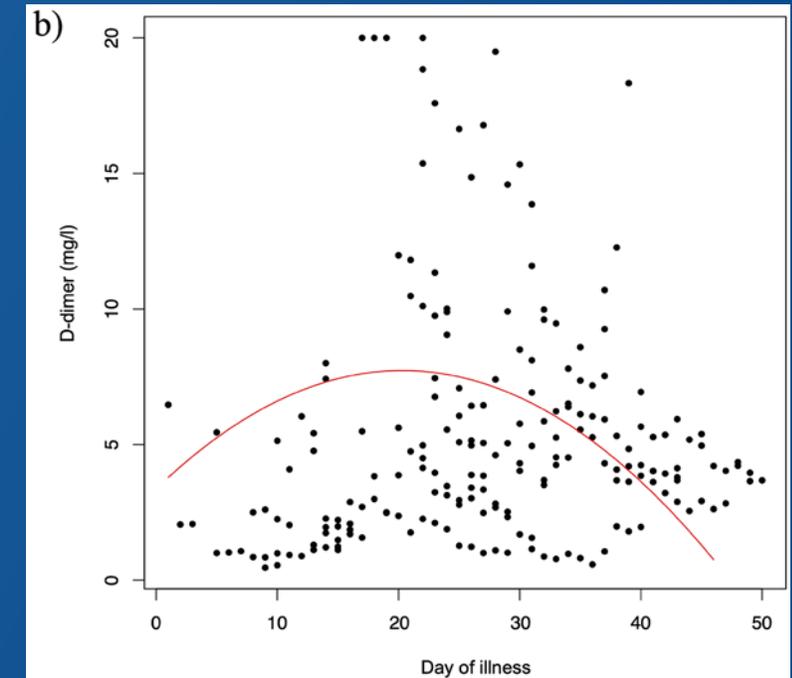
- ↑ C-reactive protein (CRP)<sup>1</sup>
- ↑ IL-6, TNF $\alpha$ , IL-1, IL-10, IL-2<sup>2</sup>
- ↑ ferritin<sup>4</sup>
- ↑ neutrophils and WBCs<sup>1</sup>
- ↑ procalcitonin<sup>1</sup>
- **Lymphopenia**
  - Specific reductions in CD3+, CD4+ and CD8+ subpopulations of T-cells<sup>2</sup>

## Proposed biomarkers for severity of COVID-19

- ↑ IL-6 and CRP have a high predictive value for severe COVID-19<sup>5</sup>
- A high neutrophil-to-lymphocyte ratio (NLR; RI  $\leq 3$ ) and low lymphocyte-to-CRP ratio<sup>4,6</sup>
- A meta-analysis of 22 studies on hospitalized COVID-19 patients found that lymphopenia and neutrophilia at admission were associated with poorer outcomes<sup>7</sup>
- Elevated red cell distribution width (RDW) at admission associated with mortality risk<sup>8</sup>

# Coagulopathy

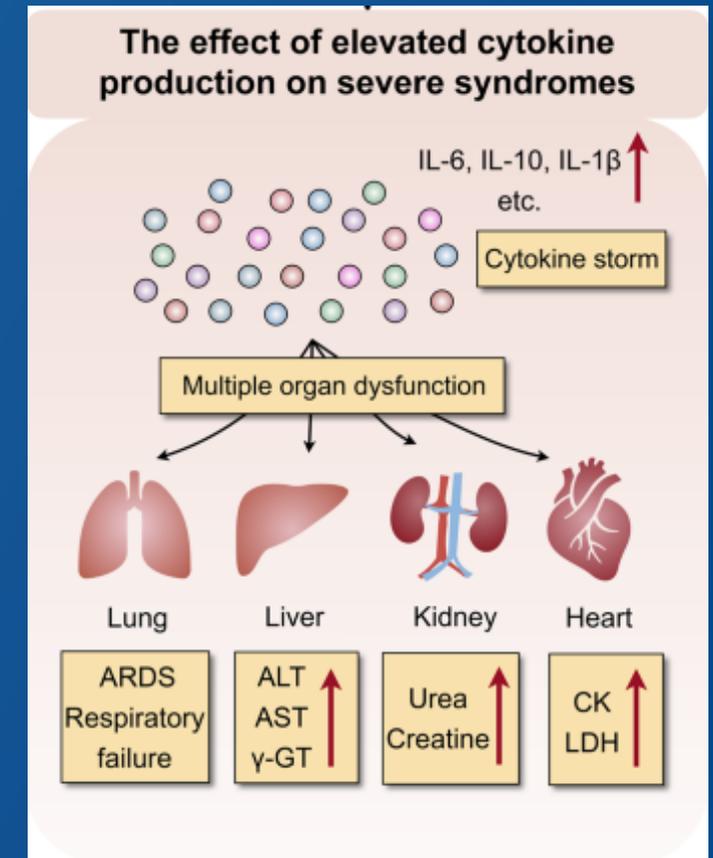
- Abnormalities in coagulation leading to venous and thromboembolic complications are found in 10-25% of COVID-19 patients requiring hospital care.<sup>10</sup>
- ↑ D-dimer in patients with COVID-19-coagulopathy
  - Higher risk of mortality (18-times) was observed with patients with D-dimer concentrations above 1 mg/L<sup>3</sup>
- Prolongation of the prothrombin time (PT) and ↓ platelets, which may be mild.<sup>3</sup>
- Fibrinogen concentrations may be either increased or decreased, depending on their stage in the progression of the disease.<sup>3</sup>



D-dimer values in ICU patients with COVID-19. Friedrich et al. 2020<sup>9</sup>

# Tissue injury

- Lung, liver, renal and cardiac injury
  - Liver injury<sup>11</sup>:
    - ↑ liver injury-associated enzymes: alanine aminotransferase (ALT) and aspartate aminotransferase (AST)<sup>11</sup>
    - ↓ albumin with diminished liver function.<sup>1</sup>
  - Acute kidney injury<sup>2</sup>
    - ↑ serum creatinine and serum urea nitrogen are associated with high risk of mortality in COVID19.
  - Cardiac injury<sup>2</sup>
    - ↑ in troponin present in 7-17% of hospitalized COVID-19 patients<sup>10</sup>
    - ↑ lactate dehydrogenase (LDH)



Yang et al. 2020<sup>11</sup>

# Conclusion

- Clinical laboratory findings in COVID19 include parameters of
  - Inflammation: IL-6, procalcitonin, CRP, lymphopenia and neutrophilia.
  - Coagulopathy: D-dimer, PT, platelets, fibrinogen
  - Tissue injury: LDH, AST, ALT, creatinine, troponin
- More studies are needed on the associations of laboratory markers and predictive calculations to outcomes as therapies for COVID-19 evolve, as well as understanding the impact of comorbidities on these laboratory markers.
- The ability for laboratories to provide valuable, timely, and accurate testing in the setting of COVID-19 is essential in the management of the pandemic.



@drayalopez

# References

1. Lippi, G., & Plebani, M. (2020). The critical role of laboratory medicine during coronavirus disease 2019 (COVID-19) and other viral outbreaks, *Clinical Chemistry and Laboratory Medicine (CCLM)*, 58(7), 1063-1069.
2. Weidmann, Maxwell D, et al. "Laboratory Biomarkers in the Management of Patients With COVID-19." *American Journal of Clinical Pathology*, 2020, doi:10.1093/ajcp/aqaa205.
3. Marcel Levi, Jecko Thachil, Toshiaki Iba, Jerrold H Levy. Coagulation abnormalities and thrombosis in patients with COVID-19, *The Lancet Haematology*, Volume 7, Issue 6, 2020, Pages e438-e440
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5. Herold T, Jurinovic V, Arnreich C, Lipworth BJ, Hellmuth JC, von Bergwelt-Baildon M, Klein M, Weinberger T. Elevated levels of IL-6 and CRP predict the need for mechanical ventilation in COVID-19. *J Allergy Clin Immunol*. 2020 Jul;146(1):128-136.e4. doi: 10.1016/j.jaci.2020.05.008. Epub 2020 May 18.
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7. Henry B, Cheruiyot I, Vikse J, Mutua V, Kipkorir V, Benoit J, Plebani M, Bragazzi N, Lippi G. Lymphopenia and neutrophilia at admission predicts severity and mortality in patients with COVID-19: a meta-analysis. *Acta Biomed*. 2020 Sep 7;91(3):e2020008.
8. Foy BH, Carlson JCT, Reinertsen E, Padros I Valls R, Pallares Lopez R, Palanques-Tost E, Mow C, Westover MB, Aguirre AD, Higgins JM. Association of Red Blood Cell Distribution Width With Mortality Risk in Hospitalized Adults With SARS-CoV-2 Infection. *JAMA Netw Open*. 2020 Sep 1;3(9):e2022058.
9. Friedrich MS, Studt JD, Braun J, Spahn DR, Kaserer A. Coronavirus-induced coagulopathy during the course of disease. *PLoS One*. 2020 Dec
10. Wiersinga WJ, Rhodes A, Cheng AC, Peacock SJ, Prescott HC. Pathophysiology, Transmission, Diagnosis, and Treatment of Coronavirus Disease 2019 (COVID-19): A Review. *JAMA*. 2020;324(8):782–793.
11. Yang, L., Liu, S., Liu, J. et al. COVID-19: immunopathogenesis and Immunotherapeutics. *Sig Transduct Target Ther* 5, 128 (2020).

# COVID-19 Variants and Surveillance

**Chris Elkins**

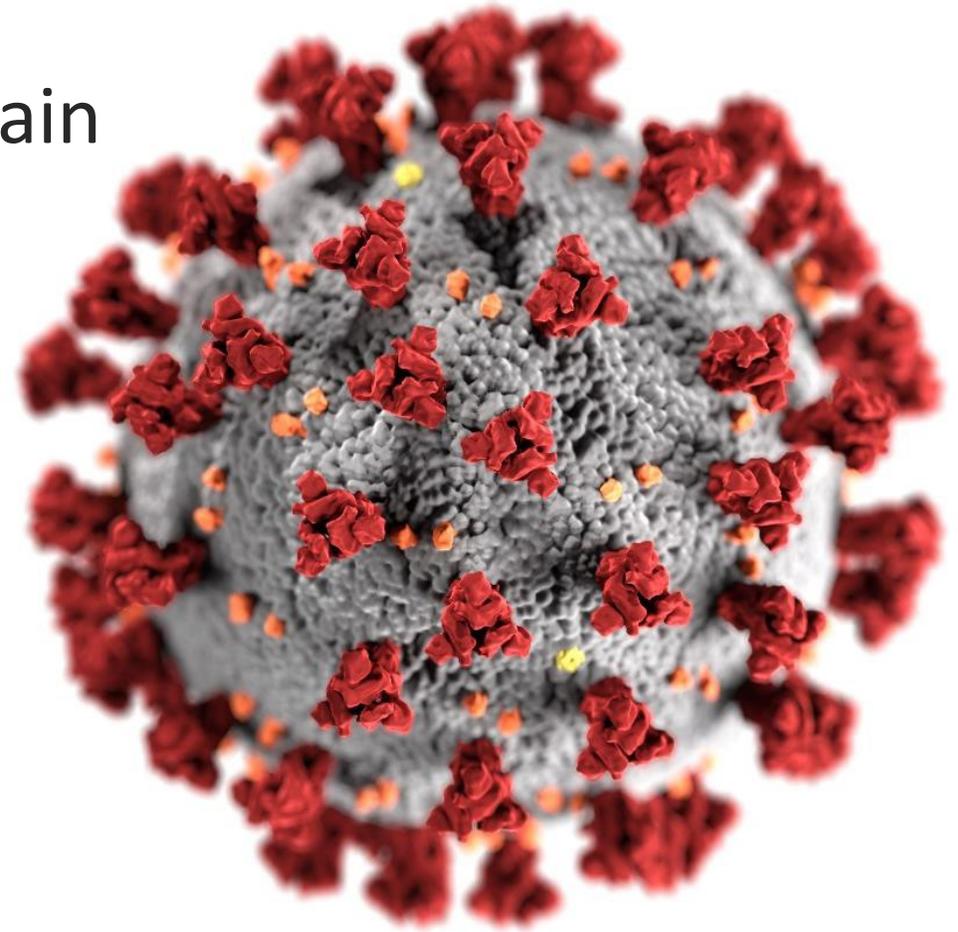
CDC COVID-19 Laboratory and Testing Task Force



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

# SARS-CoV-2 Variants and Surveillance Update

- Overview of National SARS-CoV-2 Strain Surveillance (NS3)
- Update on SARS-CoV-2 variants
- Summary



# Enhancing Surveillance for SARS-CoV-2

## NS3

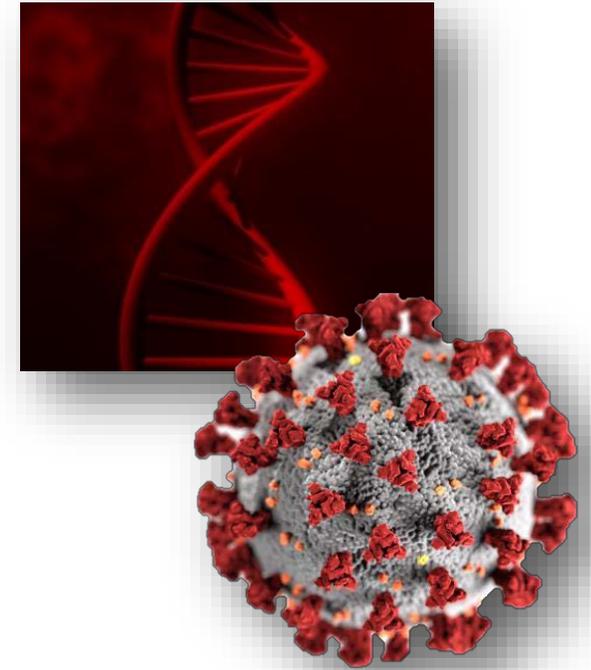
### ▪ National SARS-CoV-2 Surveillance System (NS3)

#### – Goals

- Establish a representative system for baseline virus surveillance
- Build a collection of representative SARS-CoV-2 specimens and sequences
- Isolation and characterization of viruses

#### – Strategy

- Public Health labs initially providing ~600 specimens to CDC every 2 Weeks
  - Expanded to 1,500 specimens to CDC every 2 weeks
- Specimens from a variety of geographic locations over time
- Demographic and clinical metadata contributed
- Provide viruses, reagents, and constructs for USG, academic, and private developers

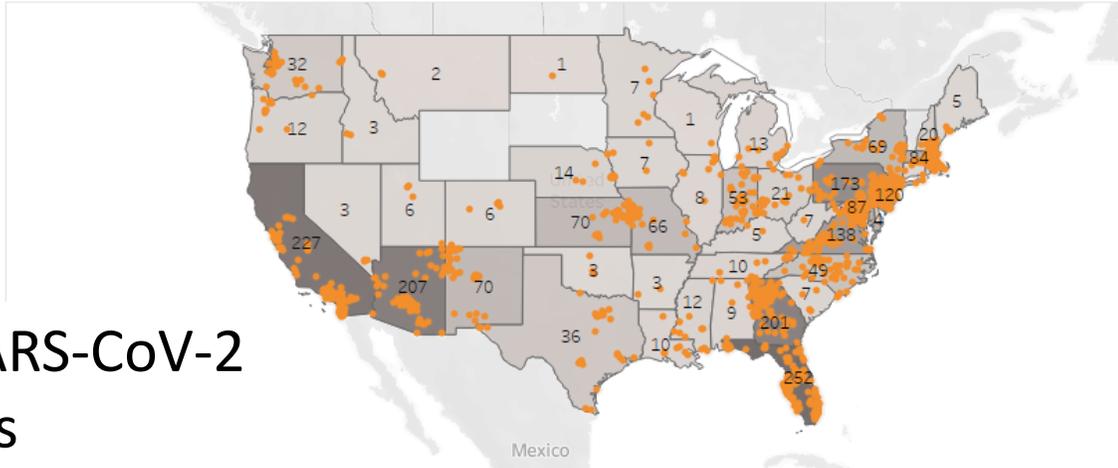




# Enhancing Surveillance for SARS-CoV-2

## Expanded Commercial Laboratory Support

Contract Sequence Sources

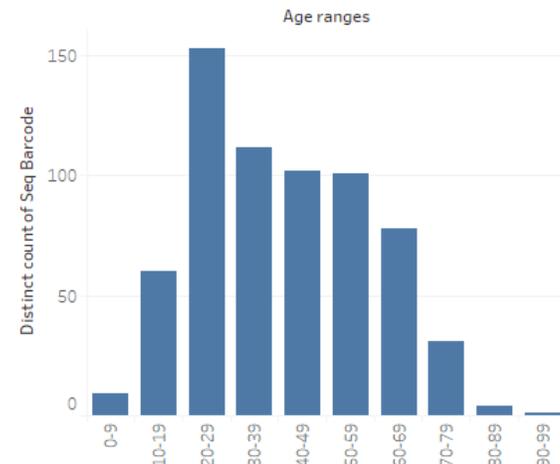


3,081 SARS-CoV-2 genomes

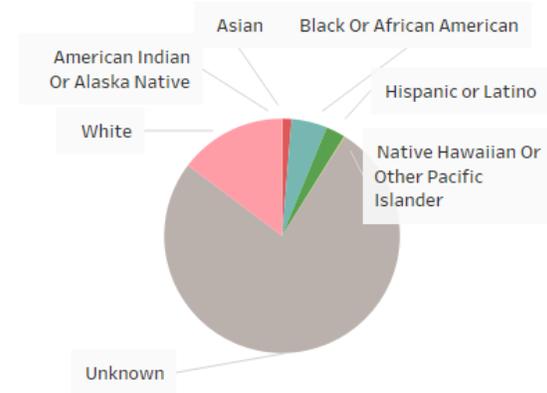
### New and Expanded Sequencing Contracts through CDC

	Current/ week	Planned/ week
<b>Illumina</b>	1,500	3,000
<b>LabCorp</b>	1,000	2,000
<b>Quest</b>	0	1,000
<b>Total</b>	<b>2,500</b>	<b>6,000</b>

Age



Race/Ethnicity



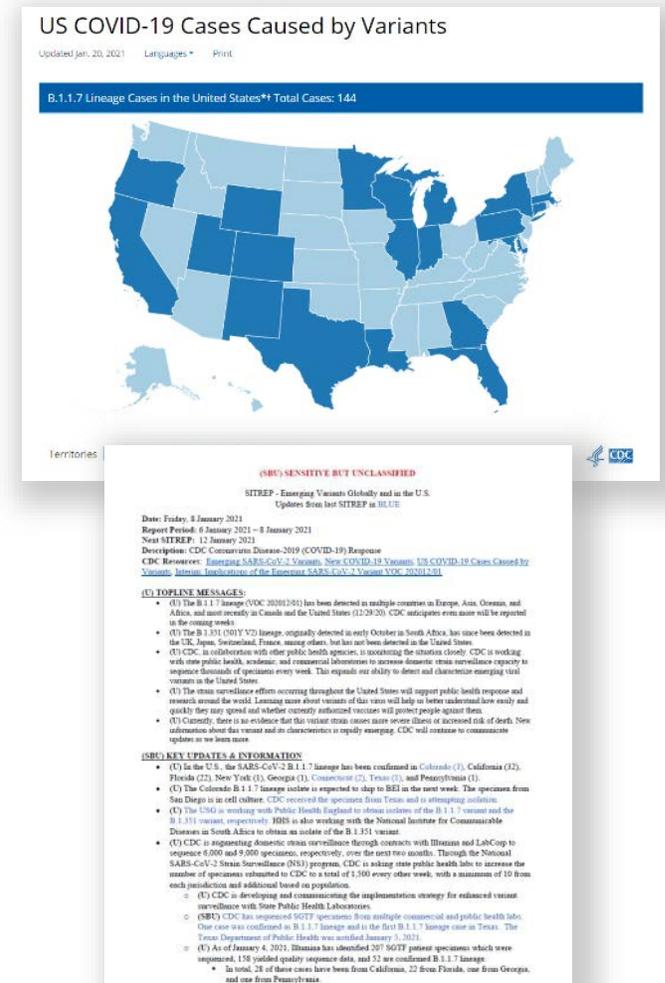
# SARS-CoV-2 Emerging Variants

- **B.1.1.7 lineage (20I/501Y.V1, VOC 202012/01)**
  - Emerged in U.K. September 2020
  - In more than 55 countries, including U.S. and Canada
  - N501Y, P681H, ORF8 stop codon (Q27stop)
  - 69/70 deletion (produces S-gene target failure with ThermoFisher TaqPath)
  - Associated with increased transmissibility
- **B.1.351 lineage (20H/501Y.V2)**
  - First detected in South Africa October 2020, now in >15 countries
  - Multiple substitutions in the spike protein: K417T, E484K, N501Y
  - Some evidence indicated E484K may affect neutralization by antibodies
- **P.1 lineage (a.k.a. 20J/501Y.V3)**
  - Branch off the B.1.1.28 lineage
  - First reported by the NIID in Japan in four travelers from Brazil
  - Contains 17 unique amino acid changes and 3 deletions
  - K417T, E484K, N501Y, D614G, H655Y
  - May additionally be circulating in Brazil without K417T and N501Y



# Enhancing Surveillance for Variant SARS-CoV-2 NS3 and Expanded Commercial Laboratory Support

- **NS3: Additional specimens sent to CDC to address SARS-CoV-2 variants of interest**
  - Targeted surveillance
  - Specimens shipped to CDC **weekly** from Public Health Labs
  - More narrow selection criteria
  - Dynamic, short-term requests
  - Guidance continually updated
    - B.1.1.7 lineage
    - B.1.351 lineage
    - Future variant viruses
- **Commercial Laboratories: Initial focus prioritize S-gene target failures (SGTF) to improve detection of B.1.1.7 (UK Variant)**

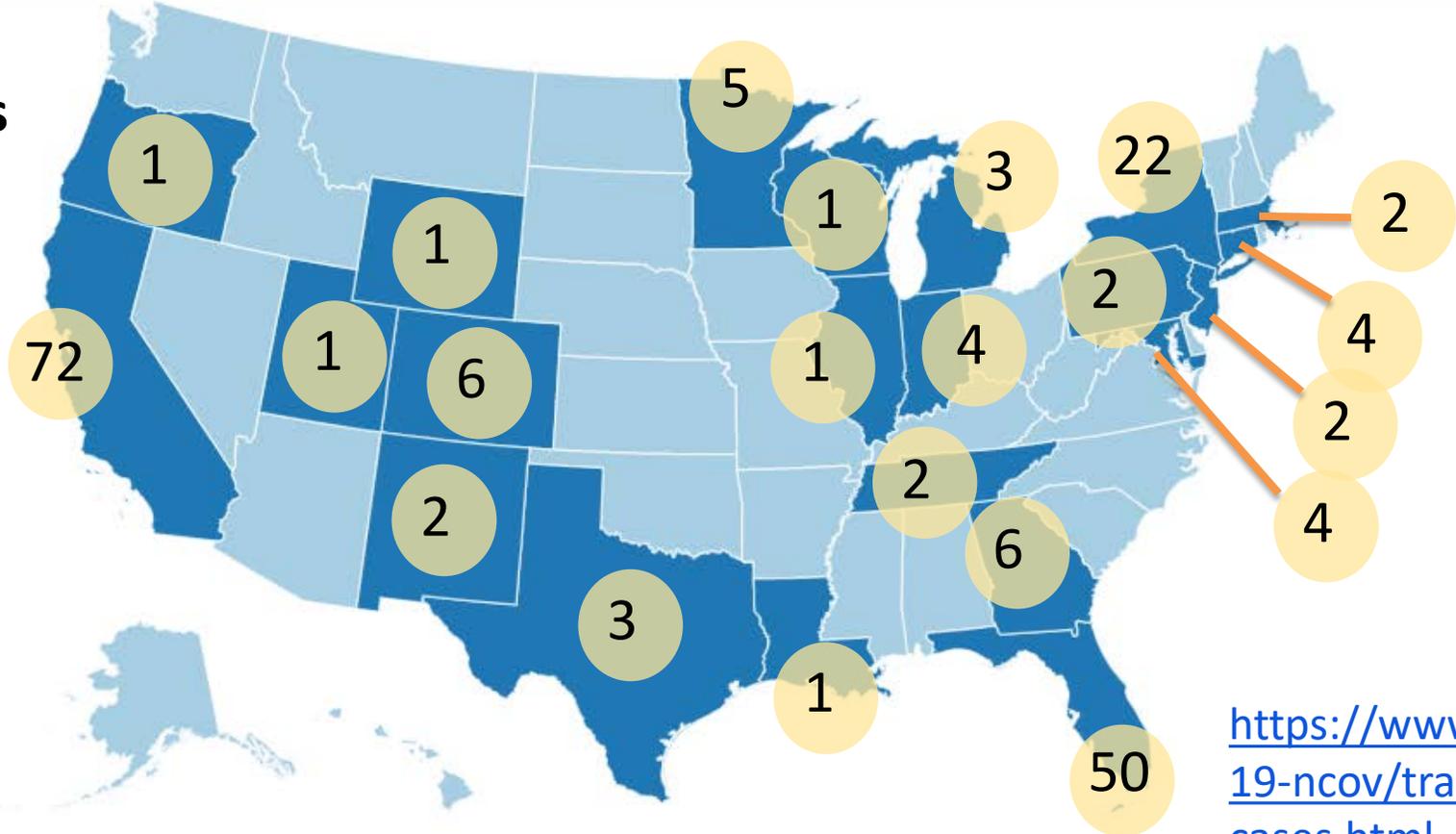


# U.S B.1.1.7 Variant SARS-CoV-2 Cases

## January 24, 2021

B.1.1.7 Lineage Cases in the United States\*† Total Cases: 195

195 Cases



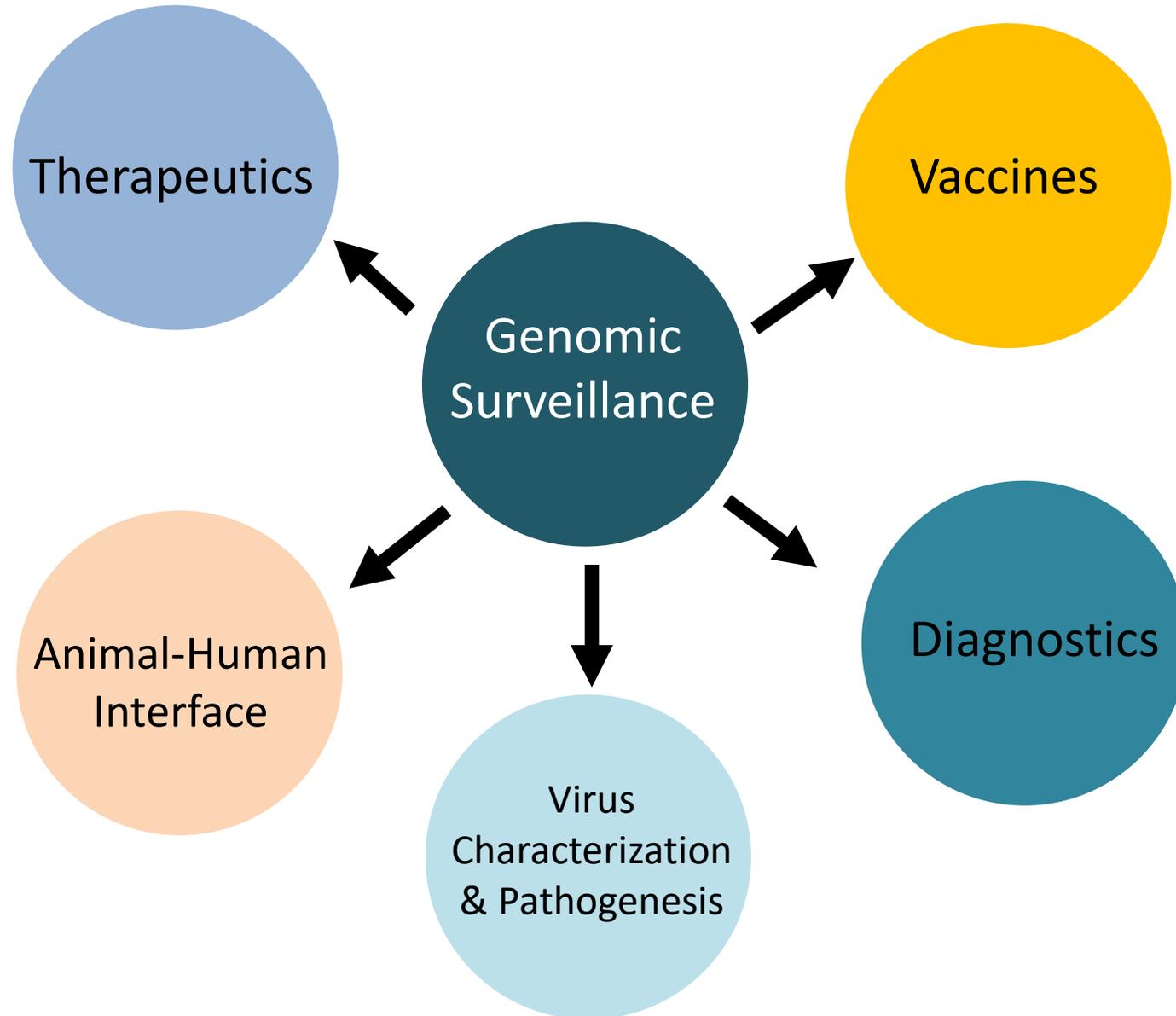
<https://www.cdc.gov/coronavirus/2019-ncov/transmission/variant-cases.html>



Territories AS GU MH FM MP PW PR VI



# Genomics for Public Health Decisions



# CMS Billing Update

**Sarah Harding**  
Centers for Medicare & Medicaid Services (CMS)



# Centers for Medicare and Medicaid Services (CMS)

- **CLIA Laboratory Guidance During COVID-19 Memo and FAQs**

<https://www.cms.gov/medicareprovider-enrollment-and-certificationsurvey/certificationgeninfo/policy-and-memos-states-and/clinical-laboratory-improvement-amendments-clia-laboratory-guidance-during-covid-19-public-health>

- **FAQs Only**

<https://www.cms.gov/medicare/quality-safety-oversight-general-information/coronavirus>



## FDA Update

**Tim Stenzel**

U.S. Food and Drug Administration (FDA)



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

# U.S. Food and Drug Administration (FDA)

- **COVID-19 Emergency Use Authorization (EUA) Information for Medical Devices**  
<https://www.fda.gov/medical-devices/emergency-situations-medical-devices/emergency-use-authorizations>
- **COVID-19 In Vitro Diagnostic EUAs**  
<https://www.fda.gov/medical-devices/coronavirus-disease-2019-covid-19-emergency-use-authorizations-medical-devices/vitro-diagnostics-euas>
- **COVID-19 Frequently Asked Questions**  
<https://www.fda.gov/emergency-preparedness-and-response/coronavirus-disease-2019-covid-19/coronavirus-disease-2019-covid-19-frequently-asked-questions>
- **COVID-19 Updates**  
<https://www.fda.gov/emergency-preparedness-and-response/mcm-legal-regulatory-and-policy-framework/emergency-use-authorization#2019-ncov>
- **FDA Townhall Meetings**  
<https://www.fda.gov/medical-devices/workshops-conferences-medical-devices/virtual-town-hall-series-immediately-effect-guidance-coronavirus-covid-19-diagnostic-tests-06032020>
- **Independent Evaluations of COVID-19 Serological Tests**  
<https://open.fda.gov/apis/device/covid19serology/>

# U.S. Food and Drug Administration (FDA)

- **COVID-19 Diagnostic Development**

[CDRH-EUA-Templates@fda.hhs.gov](mailto:CDRH-EUA-Templates@fda.hhs.gov)

- **Spot Shortages of Testing Supplies: 24-Hour Support Available**

1. Call 1-888-INFO-FDA (1-888-463-6332)

2. Then press star (\*)

- **FDA MedWatch**

<https://www.fda.gov/safety/medwatch-fda-safety-information-and-adverse-event-reporting-program>

# CDC Social Media



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

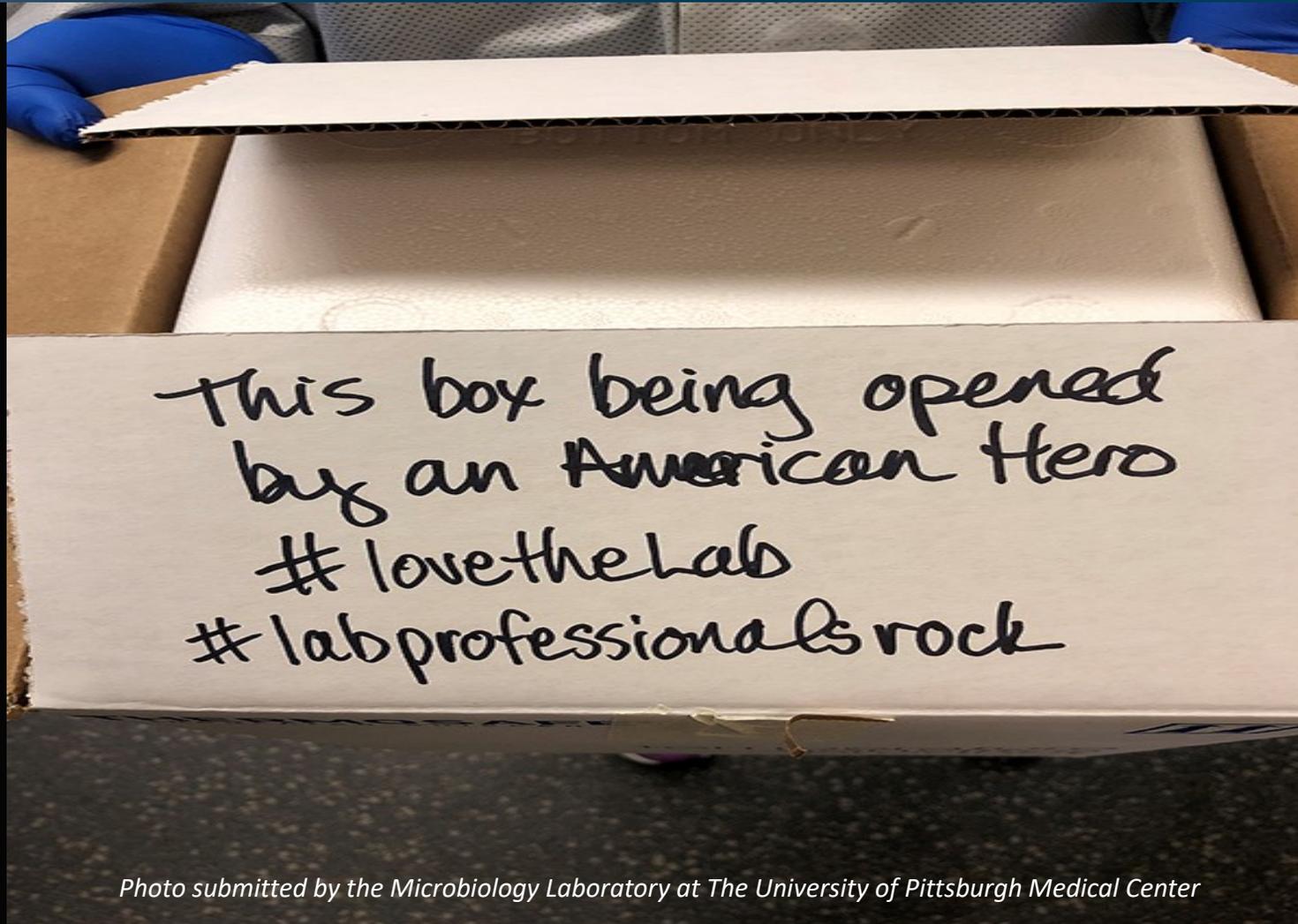


<https://twitter.com/cdcgov>



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

# Thank You For Your Time!



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