Clinical Laboratory COVID-19 Response Call

Monday, December 28th, 2020 at 3:00 PM ET

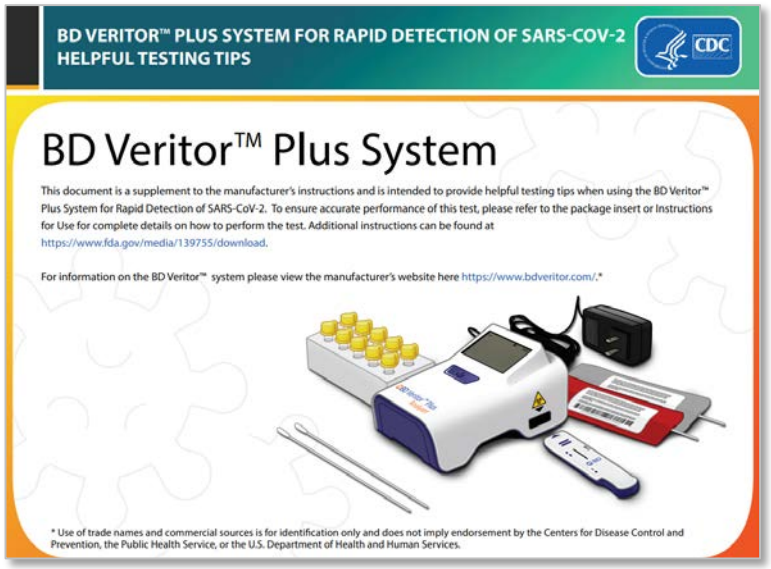
- **Welcome**
  - Jasmine Chaitram, CDC Division of Laboratory Systems (DLS)
- **Clinical Laboratory Surge Testing Survey**
  - Corey Meyer, Gryphon Scientific
- **Electronic Laboratory Reporting for COVID-19: Summary Findings from the CSTE COVID-19 ELR Capabilities and Needs Assessment**
  - Brooke Beaulieu, Council of State and Territorial Epidemiologists (CSTE)
- **Updates from the Infectious Diseases Pathology Branch**
  - Jana Ritter and Hannah Bullock, CDC Division of High-Consequence Pathogens and Pathology (DHCPP)
- **Q&A Panel**
  - Ren Salerno, CDC Division of Laboratory Systems (DLS)
  - Jason Hall, CDC Division of Preparedness and Emerging Infections (DPEI)
  - Tim Stenzel, U.S. Food and Drug Administration (FDA)
  - Amy Zale, Centers for Medicare & Medicaid Services (CMS)

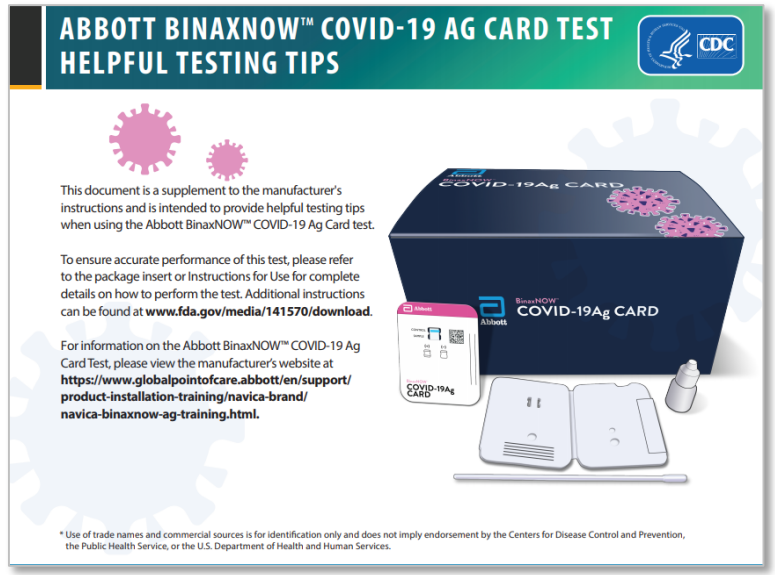
New SARS-CoV-2 Antigen Testing Infographics

[BD Veritor™ Plus System]

[Quidel® Sofia® and Sofia 2®]

[Abbott BinaxNOW™]





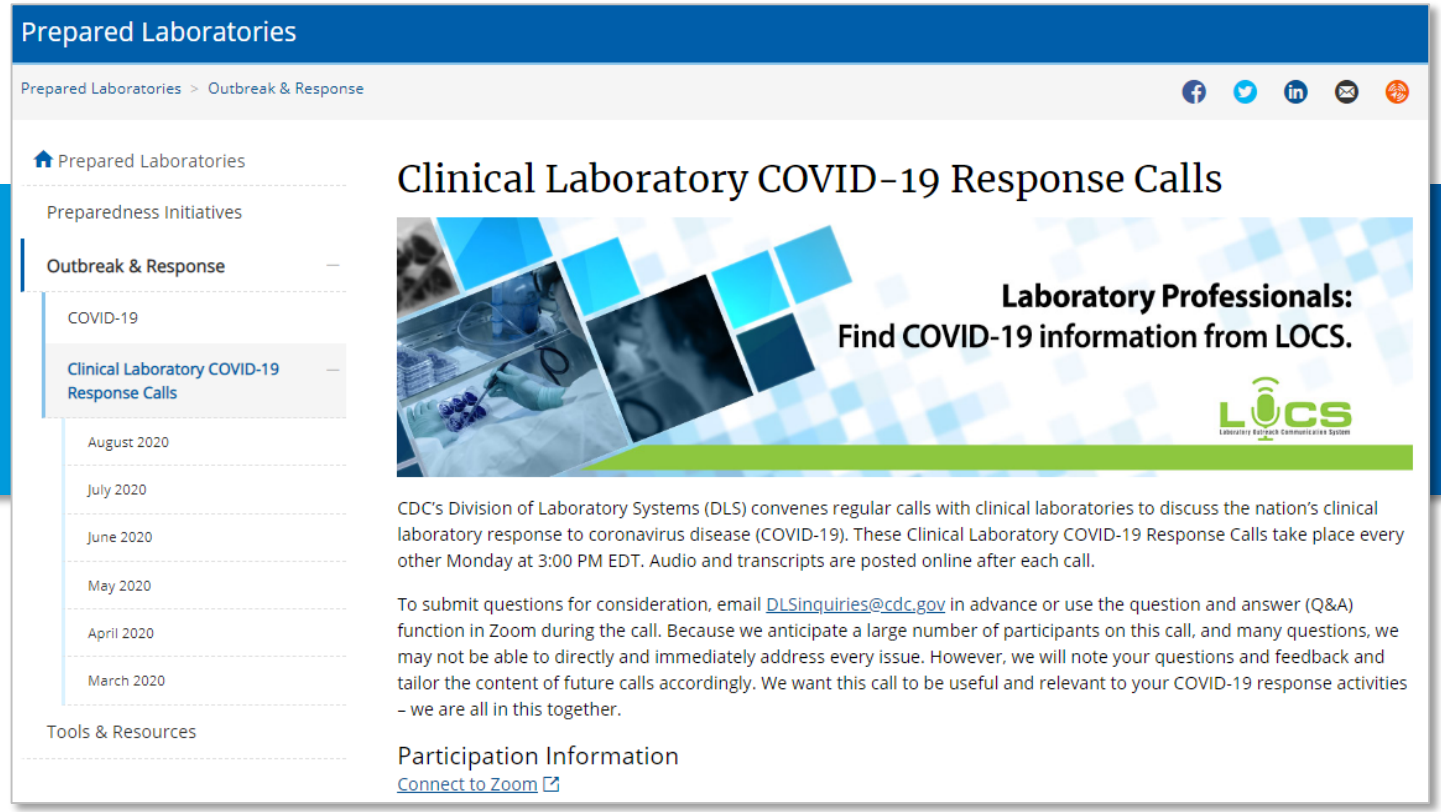
COVID-19 Resources for Laboratories

- **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 Preparedness Portal



Schedule for Clinical Laboratory COVID-19 Response Calls

The next call will be on **Monday, January 11th**

from **3:00 PM to 4:00 PM ET**

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

GRYPHON SCIENTIFIC Science. Security. Strategy.

Clinical Laboratory Surge Testing Survey

Presented by Corey Meyer, Ph.D.

December 28, 2020

Clinical Laboratory Surge Testing Survey

- On behalf of CDC's Division of Laboratory Systems, Gryphon Scientific is conducting a ***national survey of clinical laboratories***
- Purpose is to understand whether and how laboratories would choose to participate in surge testing during a public health emergency
- Gryphon's teammates provide strong subject matter expertise

What topics will be covered in the survey?

Capability

- What types of testing does your lab perform?
- What are your lab's informatics capabilities?

Capacity

- What challenges would your lab face in increasing testing capacity to meet surge demands?

Willingness

- What factors influence your lab's willingness to perform surge testing?
- How would your lab like to communicate with CDC during an emergency?

COVID-19

- What business, logistical, and technical challenges has your lab faced in performing COVID-19 testing?

Questions will cover issues relevant to chemical, radiological, and biological (deliberate and natural) incidents.

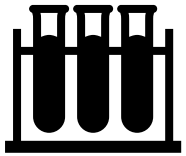
How will the survey data be used?

Evaluate

Engage stakeholders from the public health and clinical lab sectors to discuss the survey findings and options for operationalizing them

Synthesize

Develop evidence-based findings for how to **strengthen partnerships between the public health and clinical lab sectors** to improve surge testing



Share

Share survey findings with the community via peer-reviewed publications

Survey Details

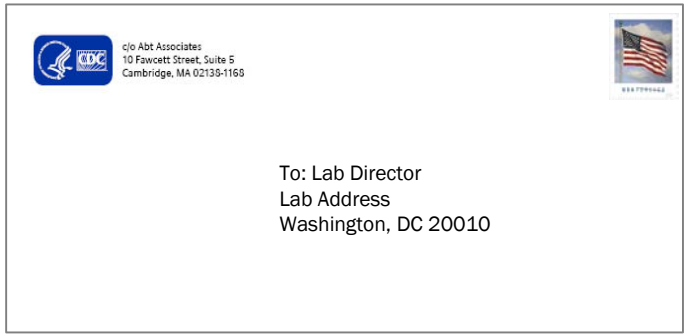
WHO A **random sample** of clinical labs that are:

- CLIA-certified to perform moderate and/or high-complexity testing in specialties relevant to CBR incidents
- Independent or hospital-associated

HOW Labs that are selected for participation in the survey will receive an invitation letter in the mail.

WHEN The first batch of invitation letters will be mailed on January 4, 2021.

- Additional batches will be mailed approximately monthly, through July 2021.



Please watch your lab's mail and encourage your lab to respond if selected for the survey!

Questions or Feedback?

Jasmine Chaitram (CDC DLS)

ClinicalLabSurvey@gryphonscientific.com

Electronic Laboratory Reporting for COVID-19

Summary Findings from the CSTE COVID-19 ELR Capabilities and Needs Assessment

CDC DLS Call, Monday December 28th, 2020

Brooke Beaulieu, MPH
Surveillance and Informatics Program
brooke@cste.org

Lab and Public Health: A Critical Partnership

CSTE: Who we are and what we do

- Professional home for applied epidemiologists working at the state, local, tribal, and territorial level across the country
- Robust community, 2000+ members that convene via regular subcommittee and workgroup calls
- Focus on capacity building and information sharing, developing case definitions for reportable and nationally notifiable diseases.

Lab data are the driving force for public health surveillance and action.

- Public health agencies use these data for case ascertainment, classification, and investigation and follow-up.
- For COVID-19, a lab report is often the first (and sometimes **only**) indication of a case.

Reporting Lab Data: From Regulation to Implementation

- In June 2020, HHS released guidance for reporting COVID-19 lab test data per the CARES Act, including a list of **required** and optional data elements for reporting to public health.

- In October 2020, CSTE sought to systematically capture jurisdictions' capabilities and needs regarding several electronic lab reporting (ELR) topics related to the HHS reporting requirements, including:
  - Mandated reporting of demographic information*
  - Ability to receive, process, and consume required data elements*
  - Ask on Order (AOE) questions*
  - Reporting from nursing homes
  - Challenges and barriers*
  - Technical assistance needs

- Responses received from 44 jurisdictions (78% response rate)

Key Findings

CSTE

Mandated Reporting of Demographic Data

- Complete demographic data are **critical** for case investigation and follow up, for determining disease trends in populations, and for resulting guidance.
- 82% of jurisdictions explicitly require reporting demographic data via state law, rule, or regulation.
  - 18% do not require through law, rule, or regulation
- **Outside of the 18 required HHS data elements**, the most frequently stipulated data elements within jurisdiction mandates were:
  - Patient full name
  - Patient date of birth
  - Patient phone number
  - Full patient address
  - Ordering provider phone number

Ability to Receive Lab Data

- 100% of respondents can technically **receive** all 18 required data elements if a facility is able to send them.
  - Even if surveillance systems do not have the ability to **process** or **consume** all the data elements
- 72% of jurisdictions are able to receive, process, or consume the optional **Ask on Order Entry (AOE)** questions, with 21% in process by the end of the year.
- How are AOE data used?
  - **Prioritizing case investigation when volume is high**
  - Data analysis
  - Filling in data gaps, special fields, or empty fields
  - Contact tracing and case investigation
  - Reporting out to State leadership, fulfilling data requests

These are successes!

How are Public Health Agencies Receiving Data?

All respondents (100%) are able to receive data sent via HL7 message.
However, in reality jurisdictions are receiving data via a patchwork of methods:

- State-produced CSV (89%)
- National ELR CSV file (57%)
- Faxed spreadsheets (45%)
- Other (48%):
  - ASCII file format
  - Manual entry, including for entry of faxed individual results (not spreadsheets)
  - Secure File Transfer Protocol (SFTP), secure email messages
  - Online web application or disease reporting portal
  - Sender-produced flat file
  - REDCap

Opportunities for Improvement

Response	Frequency as Top 3 Barrier (%)
Volume of onboarding	25 (57%)
Quality control (e.g., identifying missed files, timeliness of files, etc.)	19 (43%)
Technical barriers at sender end	17 (39%)
Manual steps/processes to prepare the data after files have been received	12 (27%)
Keeping up with the changing HHS guidance and technical specifications	10 (23%)
Collecting all data elements	9 (20%)
Hiring/training people to manage increase in volume	9 (20%)
Identifying all potential providers	8 (18%)
Maintaining a consistent stream (e.g., not receiving data routinely, but rather in batches)	3 (7%)
Other	3 (7%)
Automating files into the surveillance application	2 (5%)
Technical barriers at the public health agency.	2 (5%)

Next Steps and Discussion

CSTE

Summary and Next Steps

- Lab data are **extremely important** for public health surveillance and action.
- Jurisdictions have developed multiple solutions to **receive** data from the avalanche of new and existing reporters.
  - Some ideal (HL7), some not (paper or fax), and everything in between
  - Additional support needed for **consuming** and **using** the data
- Volume of onboarding testing facilities and incoming data, quality control, and the need for additional processing to be able to use the data are top barriers.
- CSTE appreciates the continued partnership with labs to adapt to the evolving challenges of this pandemic (and beyond) as public health agencies work to technically receive these data.

Questions?

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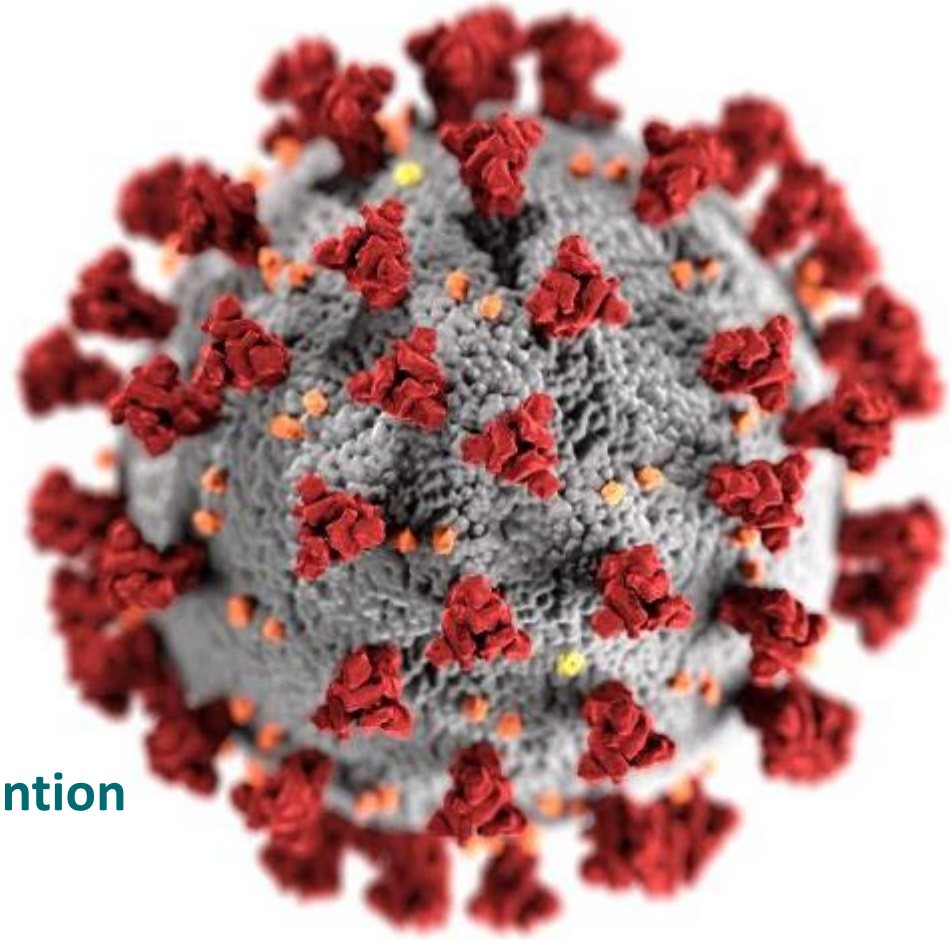
Clinical Laboratory COVID-19 Response Call
28 December 2020

Updates from the Infectious Diseases Pathology Branch

Jana M. Ritter, DVM, DACVP
Hannah Bullock, PhD

IDPB/DHCPP/NCEZID/Centers for Disease Control and Prevention



cdc.gov/coronavirus

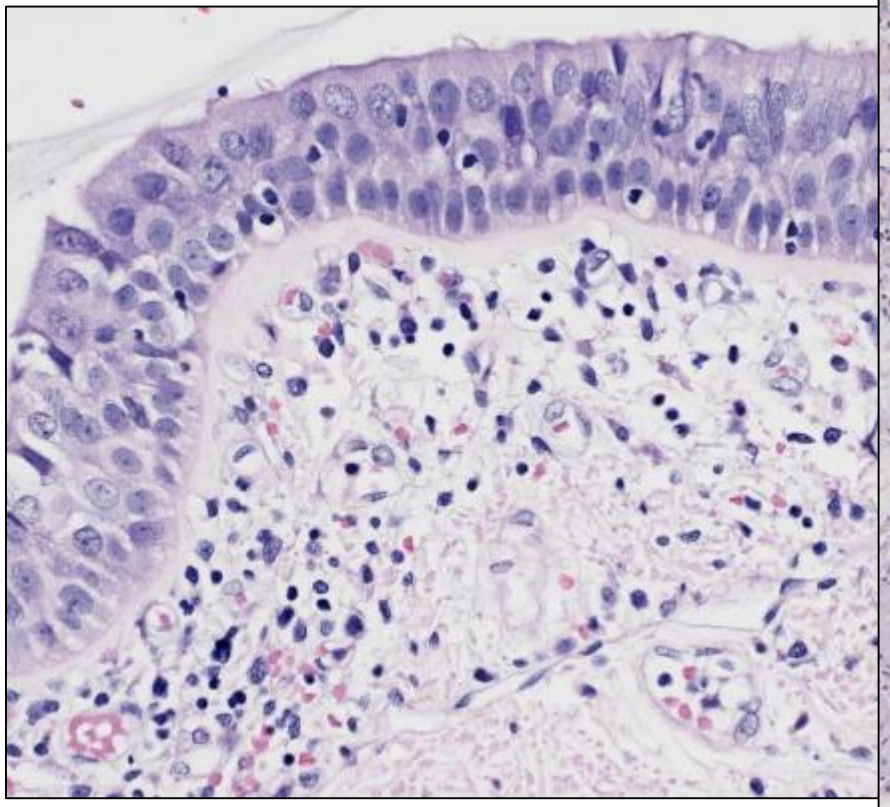
Updates from IDPB:

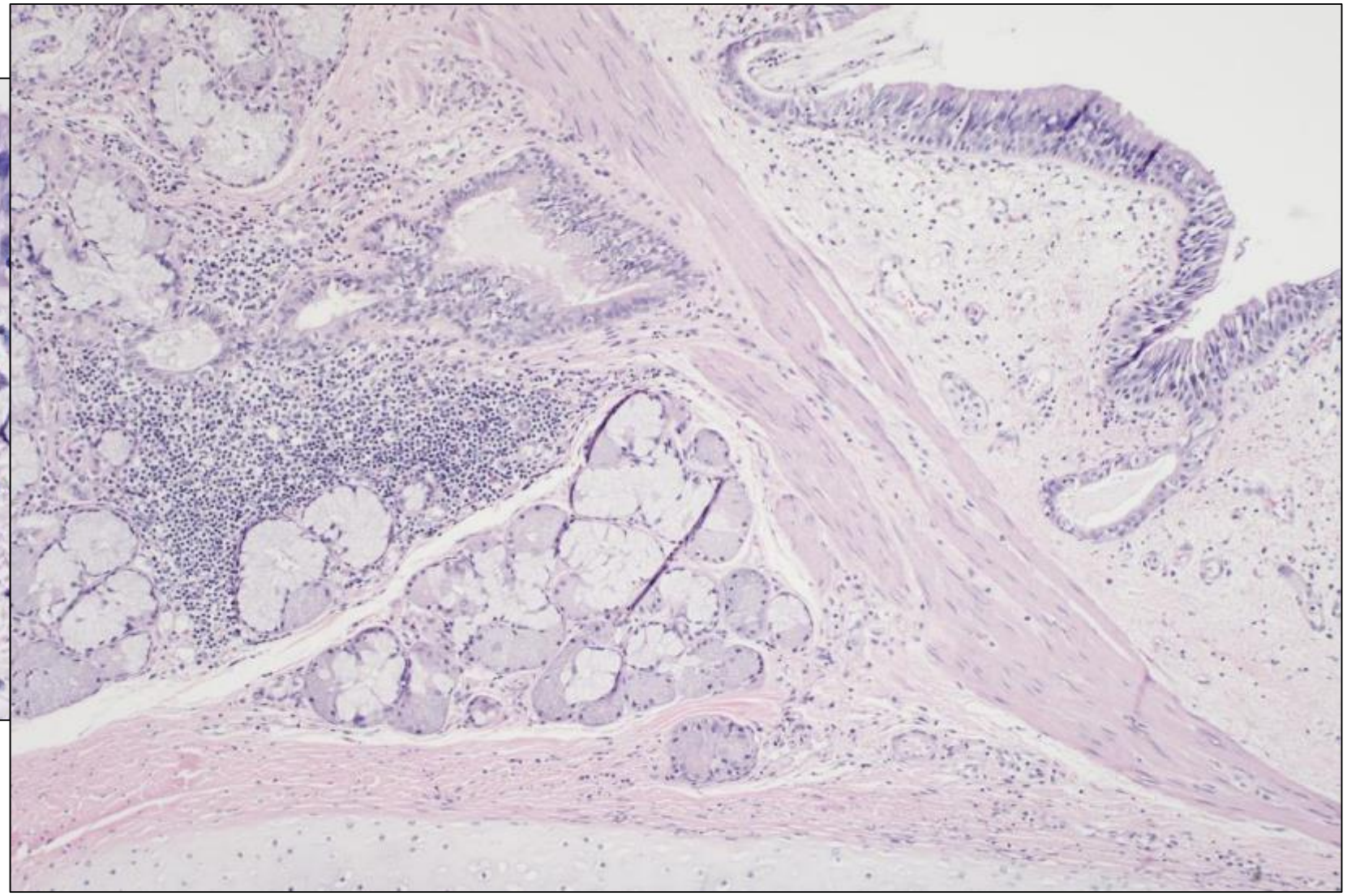
- Histopathologic findings in pediatric deaths
- Antibodies for immunohistochemistry (IHC)
- Postmortem guidance
- Electron microscopy for SARS-CoV-2

Histopathologic findings in pediatric deaths

- Clinical signs: upper respiratory infection, found unresponsive, other
- Antemortem or postmortem NP swabs + for SARS-CoV-2
- Histopathology:
  - Tracheobronchitis
  - Pulmonary edema/hemorrhage
  - Aspiration
  - Rare:
    - Mild interstitial or alveolar inflammation
    - Myocarditis
  - *NO* diffuse alveolar damage (DAD)

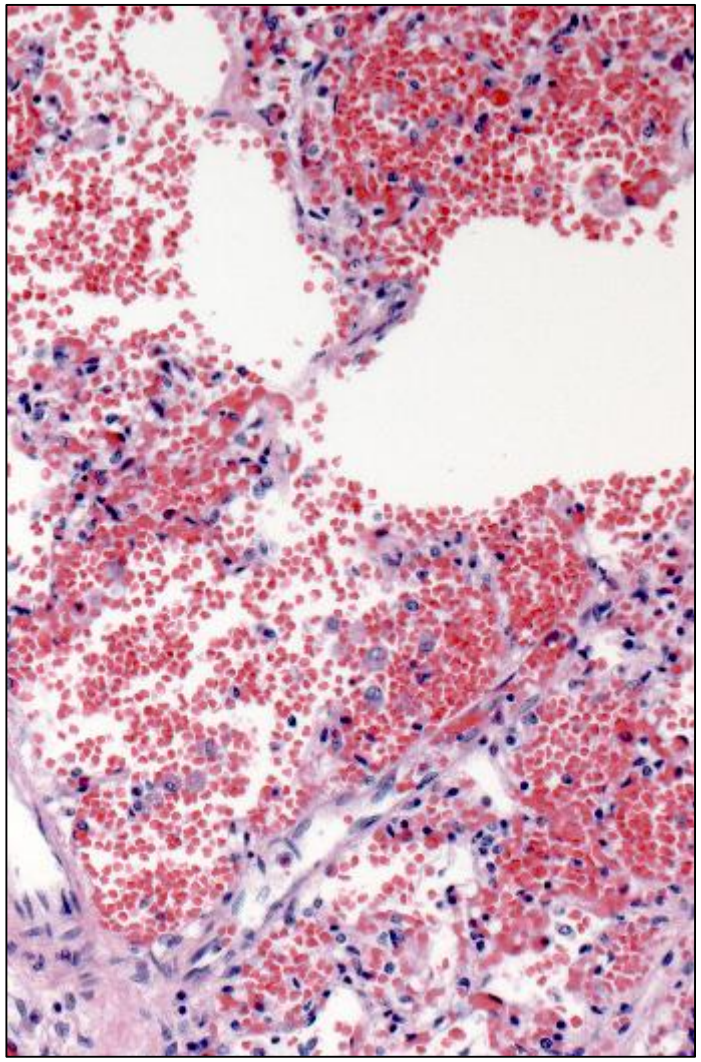
- Tracheobronchitis

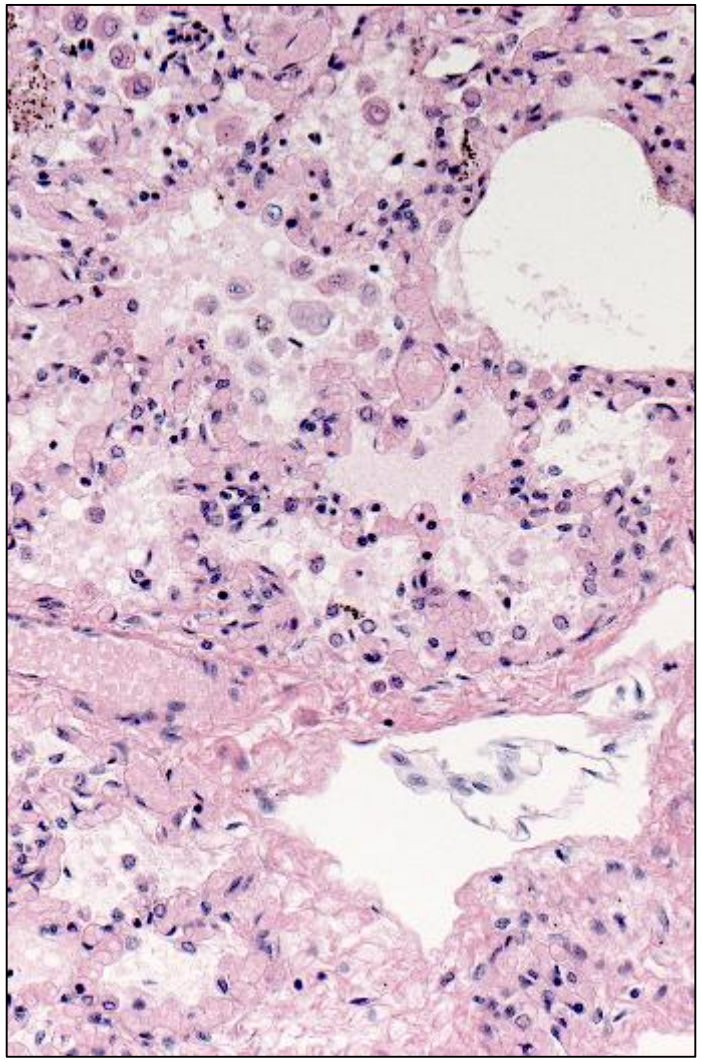


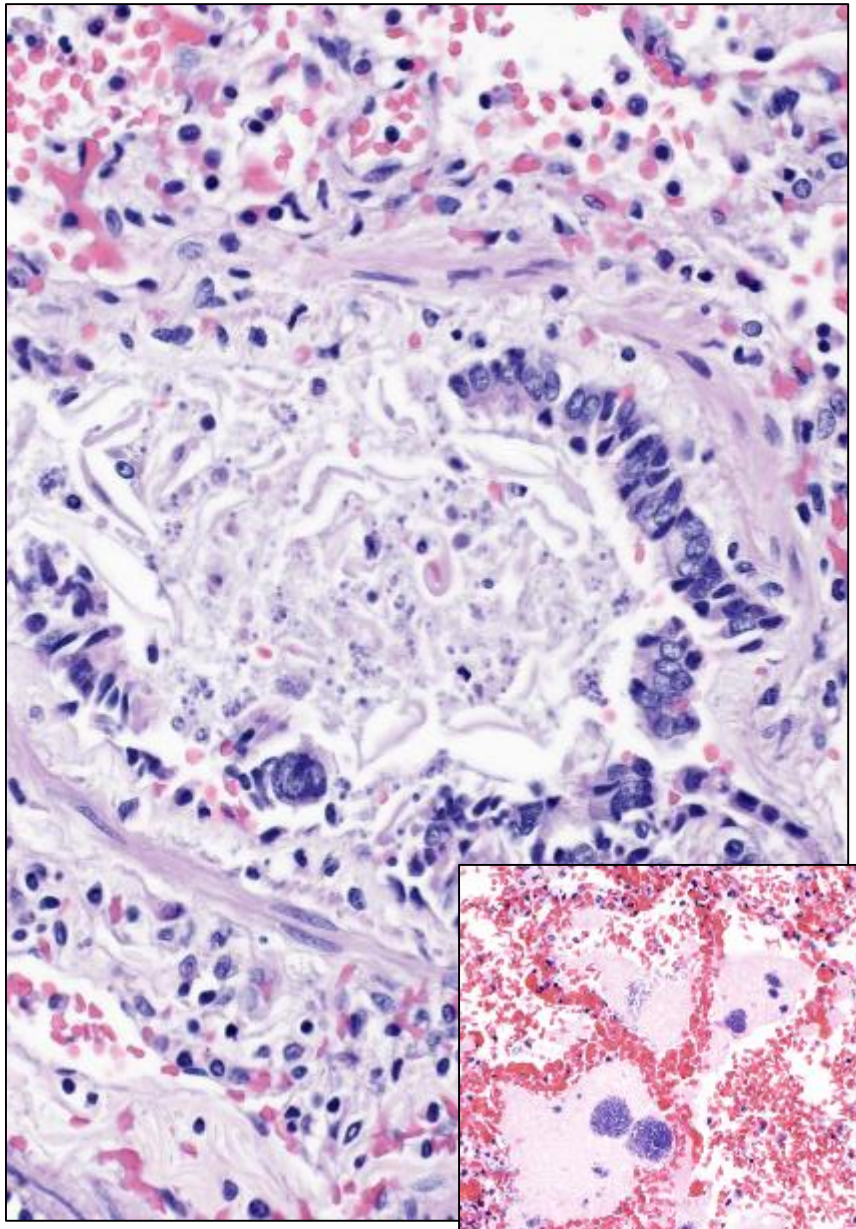


Images from IDPB

- Hemorrhage, Edema, Aspiration

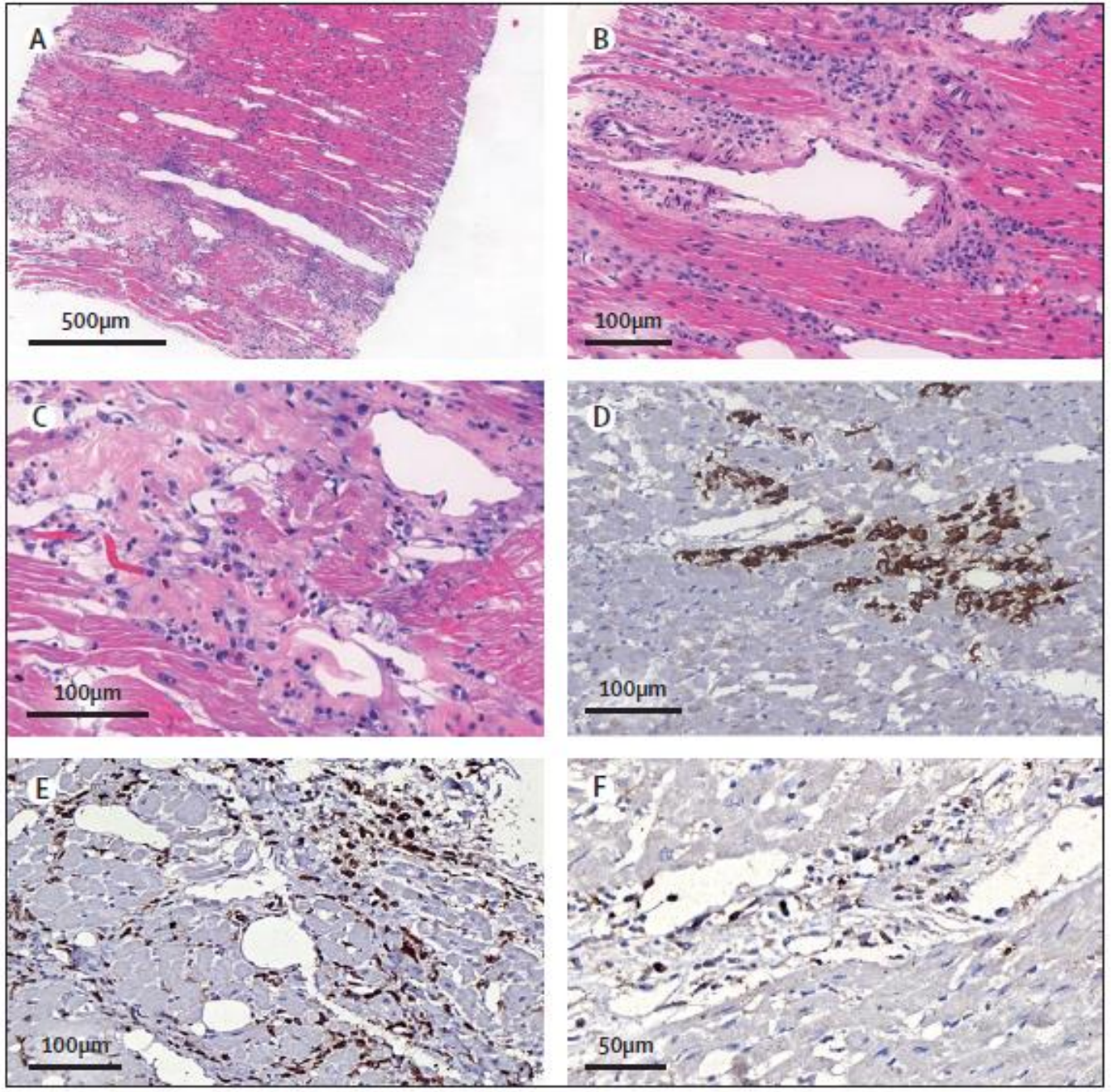






Images from IDPB

Multisystem inflammatory syndrome in Children (MIS-C)



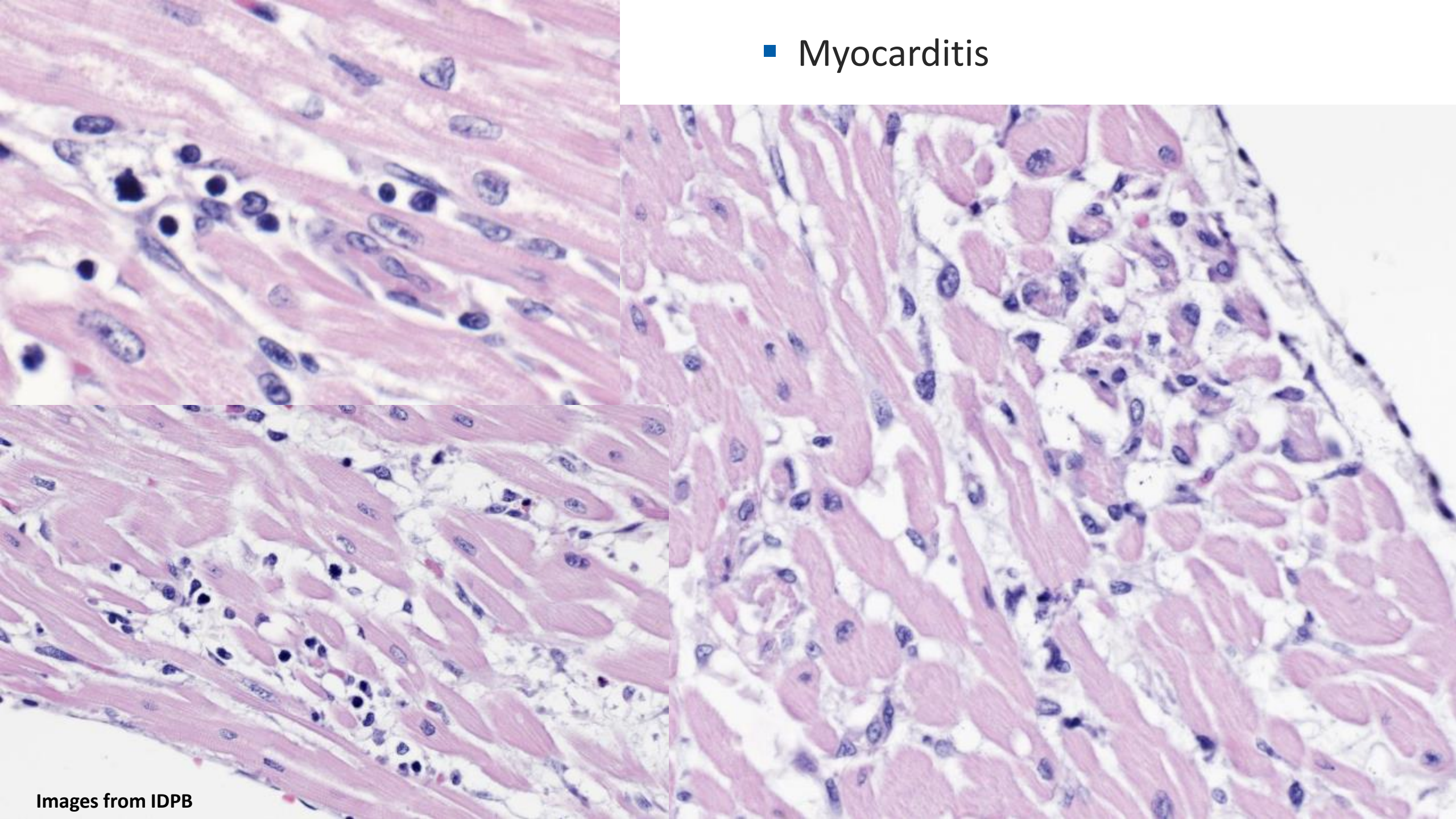
C4d

CD68

CD45

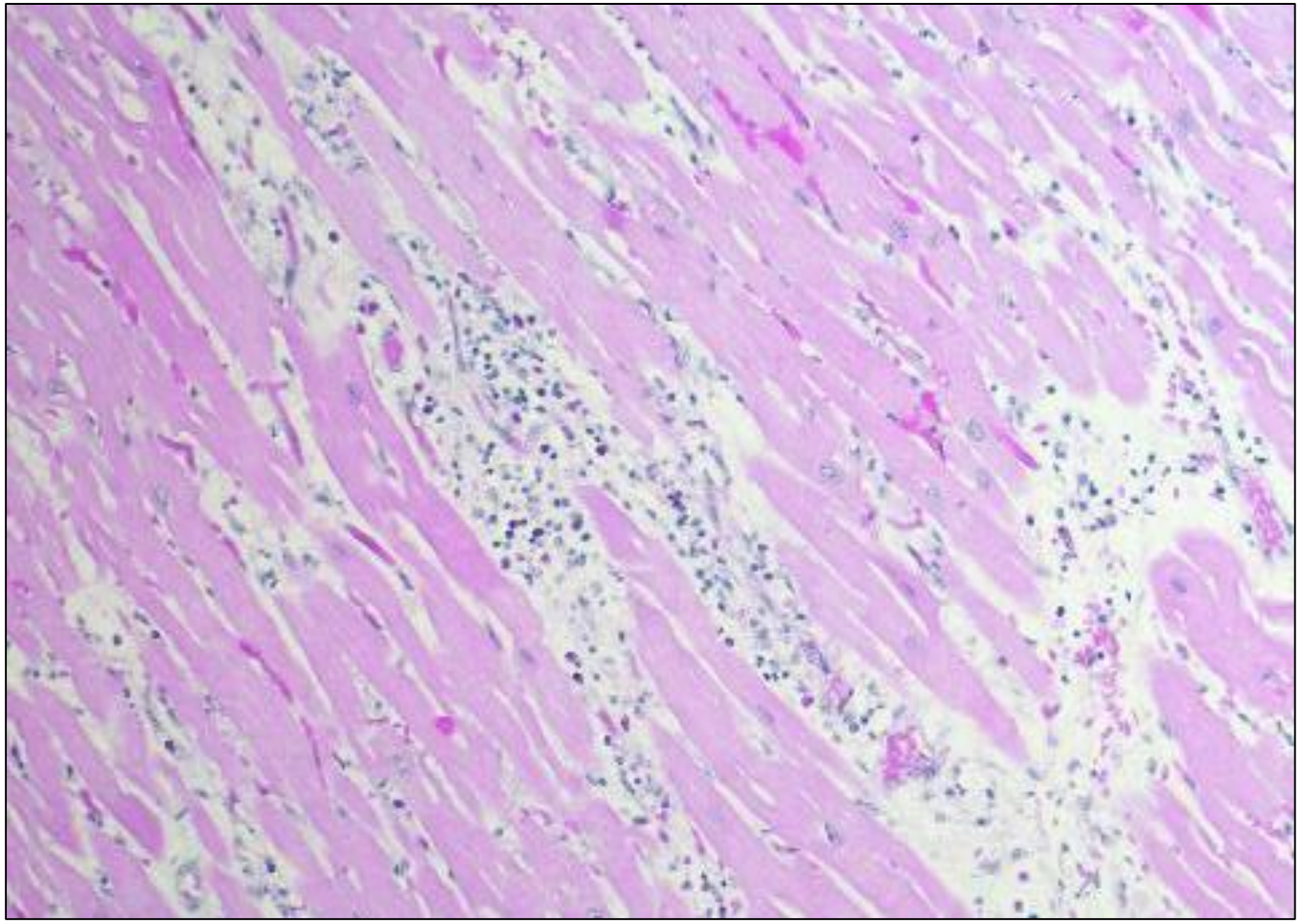
Dolhnikoff 2020. Lancet Child Adolesc Health. DOI: 10.1016/s2352-4642(20)30257-1.

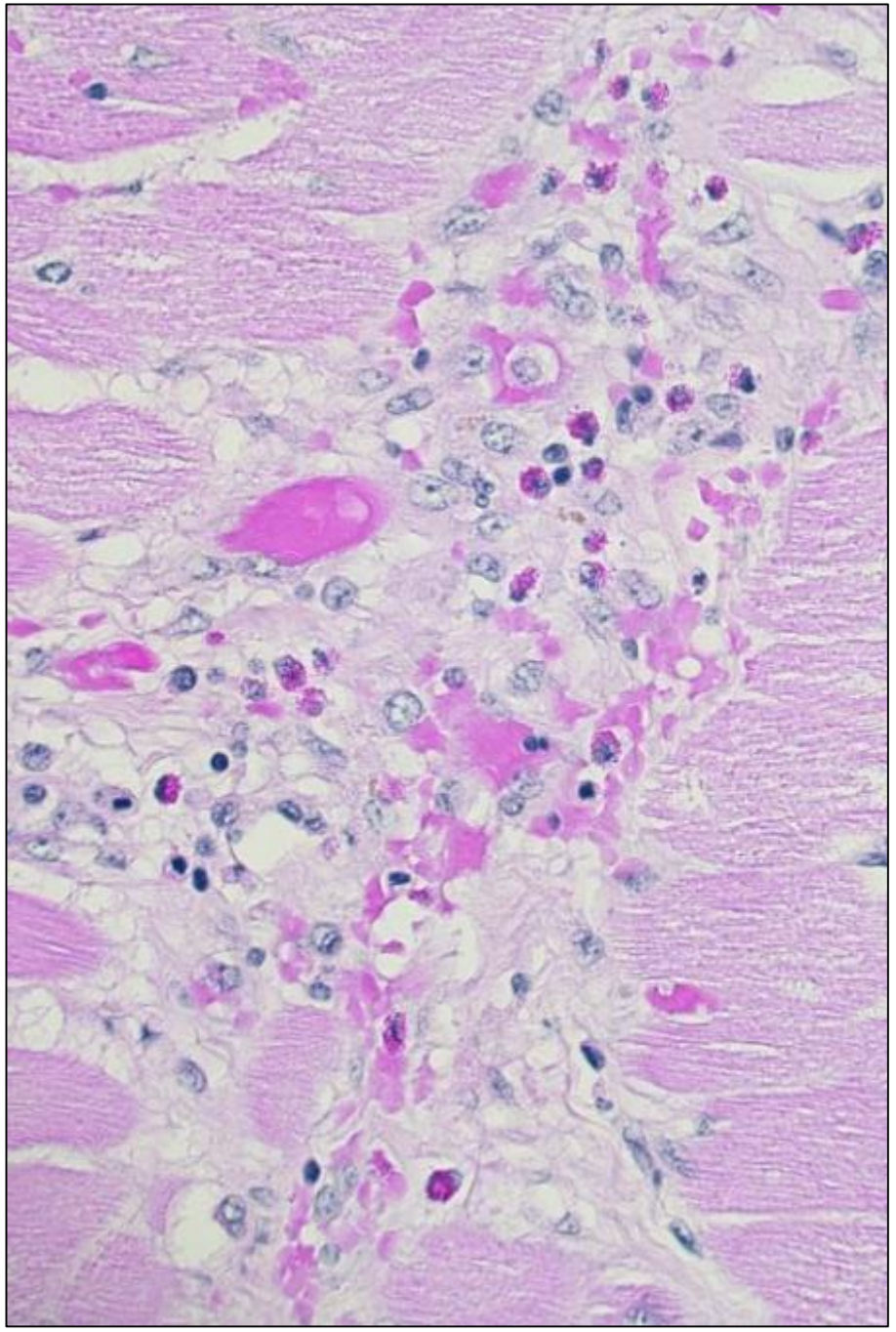
- Myocarditis



Images from IDPB

- Eosinophilic myocarditis





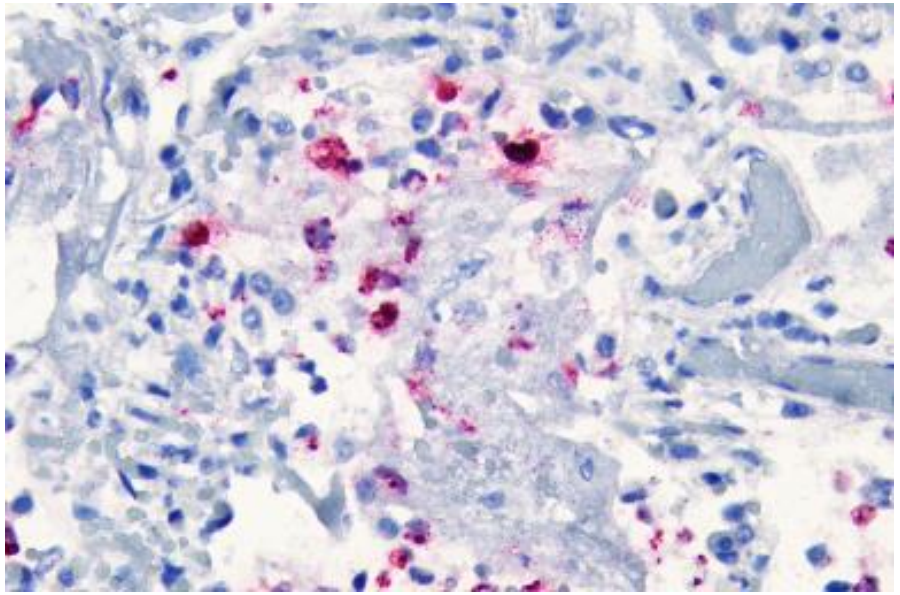
Images from IDPB

Immunohistochemistry for SARS-CoV-2

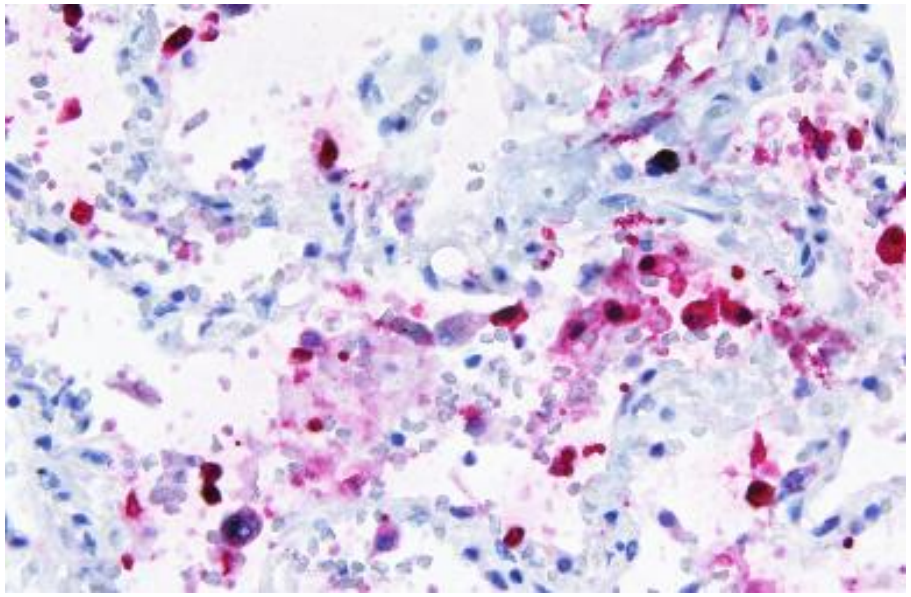
- Commercial antibodies

#Ab	Catalogue	Identity	2020-0290 (SARS-CoV-2 Control)	2005-1596 (SARS)	Host	Best Ptr	Best Diln	Primary Ab	Additional information	Comments 1	Comments 2 (Ab tested with 2020-0290A and 2020-0339C; 2020-0541 B (Joy's heart case)
1843	NB100-56562	100% to YP_009724392.1 (a.a. 1-10)	0-	0-	Rabbit	NA	NA	SARS Env	Polyclonal	No to use	NA
1844	NB100-56569	93% to YP_009724393.1	4 +	4 +	Rabbit	AR	1:50	SARS Memb	Polyclonal	Not a good option	NA
1845	NB100-56683	100% to YP_009724397.2	4+ extensive	4+ extensive	Rabbit	AR	1:100	SARS Nucleocapsid	Polyclonal	Good to test in SARS-CoV-2 cases	Positive 4; extensive
1846	NB100-56050	71% to YP_009724397.2	4+ rare	4+, rare; 2020-0338	Rabbit	AR	1:50	SARS Nucleocapsid	Polyclonal	Not a good option	NA
1847	NB100-56049	94% to YP_009724397.2	4+	4+	Rabbit	AR	1:50	SARS Nucleocapsid	Polyclonal	Good to test in SARS-CoV-2 cases	Positive 4; extensive
1848	NBP2-24745	100% to YP_009724397.2	Neg	Neg	Mouse	NA	NA	SARS Nucleocapsid	Monoclonal	Not to use	NA
1849	NBP2-24808	100% to YP_009724390.1	4+	4+	Rabbit	PK	1:25	SARS Spike	Polyclonal	Promising	Positive 2; Negative 2; Negative heart
1850	NBP2-24942	100% to YP_009724390.1	4+	4+ (2003-0262)	Mouse	AR	1:50	SARS Spike	Monoclonal	It was tested in the cases and we got rare weak staining	NA
1883	GTX632604		4+	4+	Mouse	AR	1:250	SARS Spike	Monoclonal	Good to use	Positive 4; Multifocal
1886	GTX635686		4+	4+	Rabbit	AR	1:1000	SARS-CoV-2 nucleocapsid recombinant protein	Monoclonal	Good to use	Positive 4; extensive

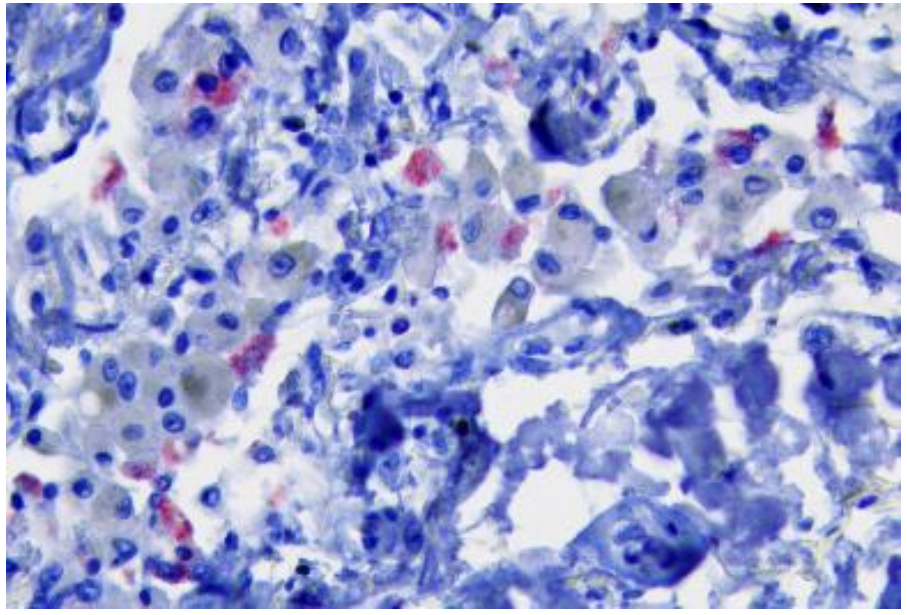
SARS Nucleocapsid – Novus Bio



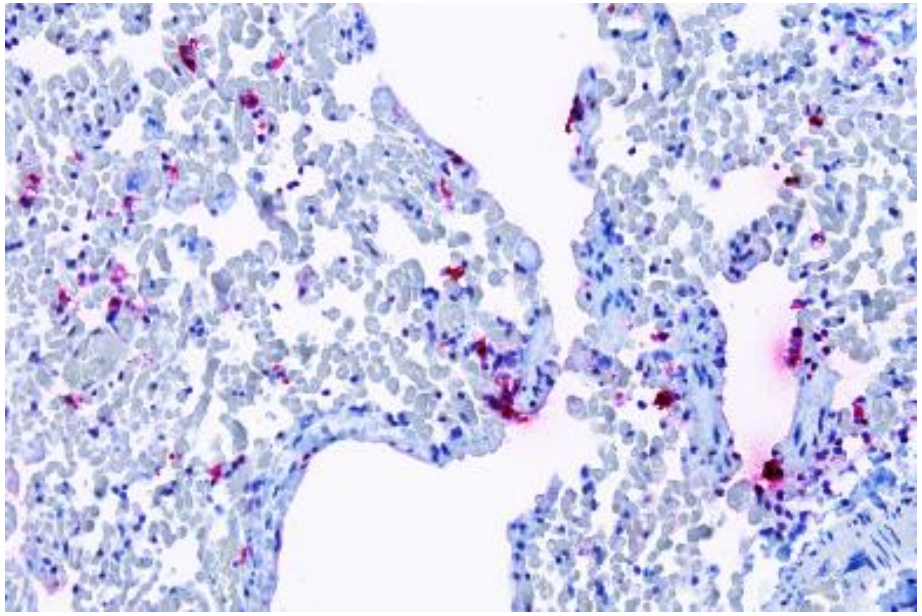
SARS Env – Novus Bio



SARS-CoV-2 Spike – CDC IDD

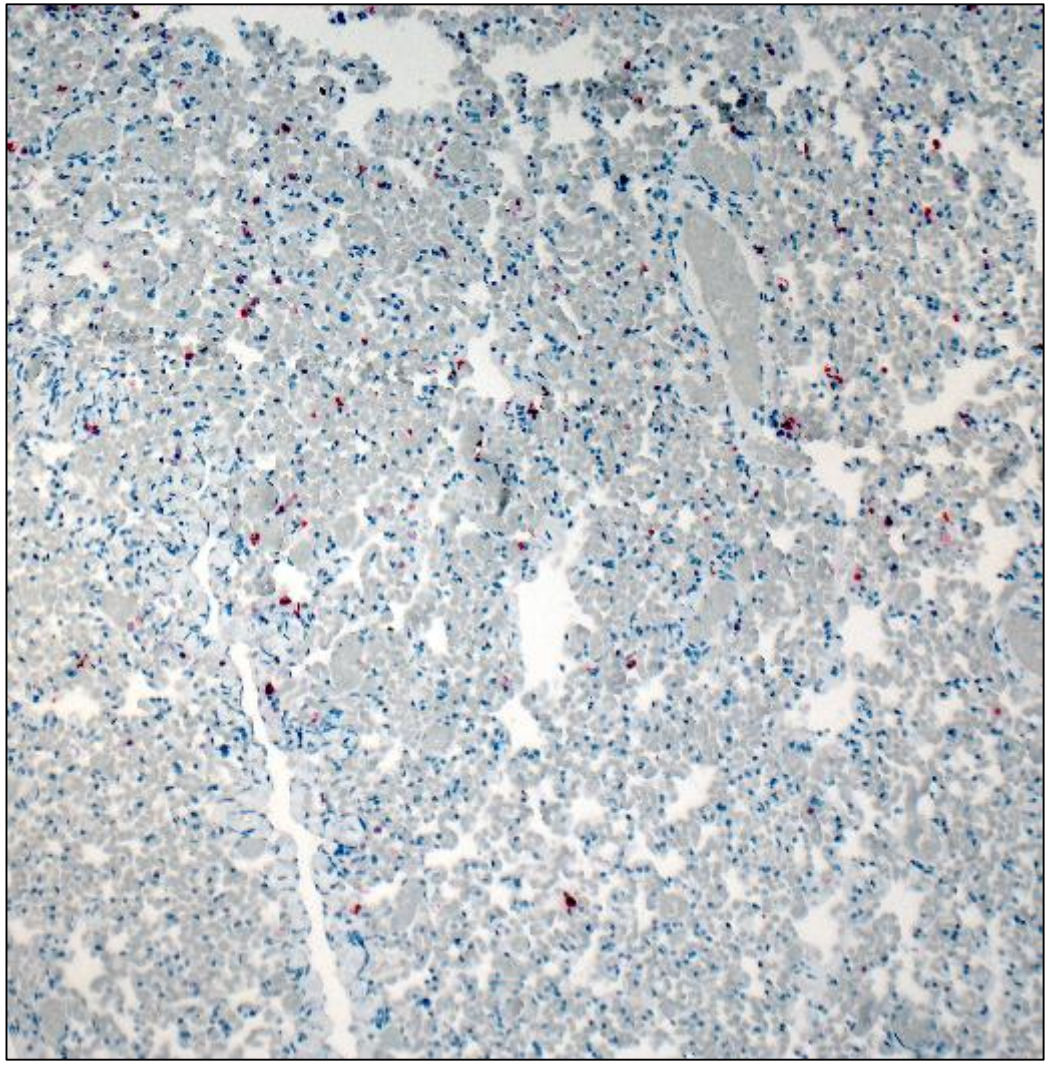


SARS-CoV-2-Nucleopcapsid Ab - GeneTex

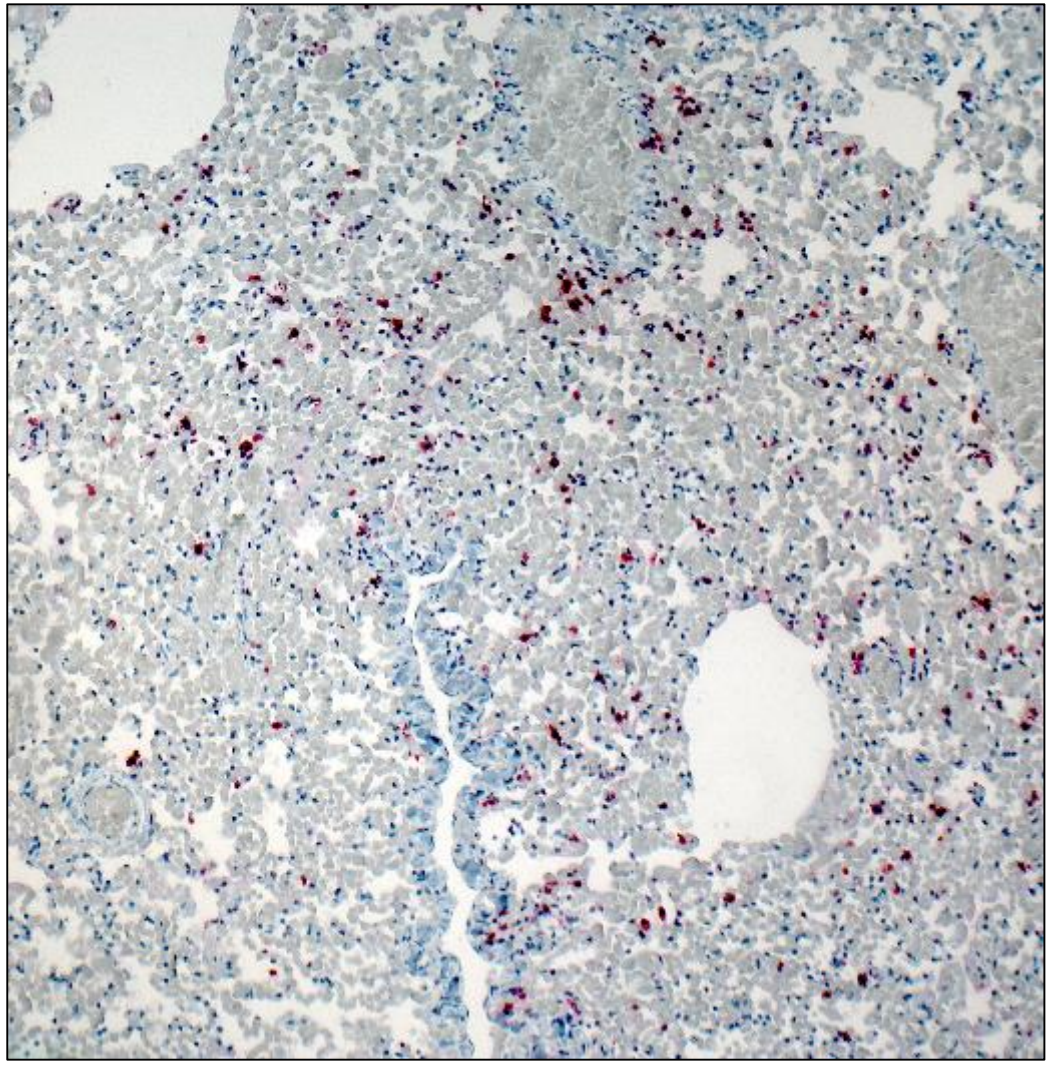


Images from IDPB

SARS-CoV nucleocapsid- Novus Bio

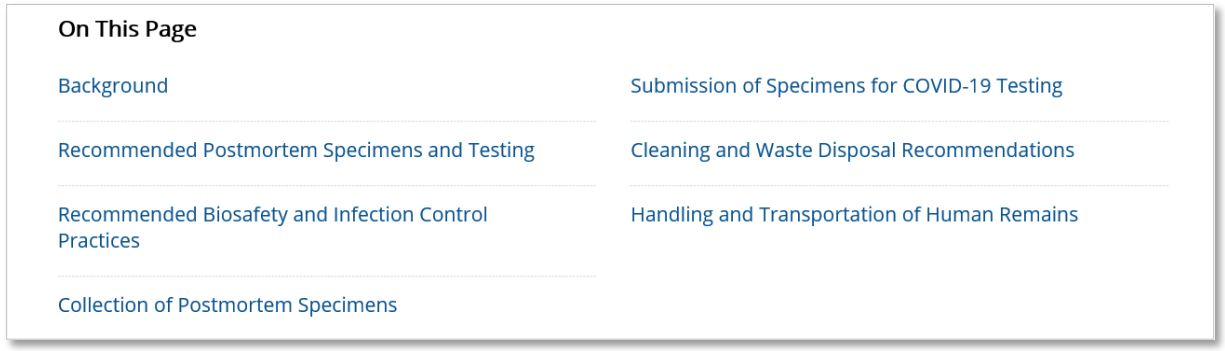


SARS-CoV-2 nucleocapsid - GeneTex



Images from IDPB

Postmortem Specimen Collection and Submission Recommendations



- Critical resource for medical examiners, coroners, pathologists, health departments
- Over 745,000 page visits since Feb. 2020
- Updates posted 12/2/2020:
  - Incorporating considerations for newer assays - antigen testing, multiplex SARS-CoV-2 and influenza nucleic acid amplification test (NAAT)
  - Revised criteria for autopsy tissue specimen submission to CDC
  - Refined autopsy tissue specimen collection recommendations
  - Updated PPE recommendations -- extended use and limited reuse measures, selecting proper eye protection and respirator
  - Refined content regarding EPA cleaning solutions, facility design considerations

https://www.cdc.gov/coronavirus/2019-ncov/hcp/guidance-postmortem-specimens.html

Instructions for submission to CDC IDPB

- Contact pathology@cdc.gov
- Healthcare providers, pathologists, medical examiners, and coroners should first contact your health department.

Submission of Fixed Autopsy Tissue Specimens to CDC

Fixed Autopsy Tissue Specimen Pre-Approval and Submission Instructions

For cases meeting the above criteria, follow the steps outlined below to obtain pre-approval from CDC's Infectious Diseases Pathology Branch to submit specimens for evaluation:

1. **Reminder–Healthcare providers, pathologists, medical examiners, and coroners—please first contact your state, tribal, local, or territorial health department for approval for specimen submission to CDC.**
2. **Contact CDC's Infectious Diseases Pathology Branch** at pathology@cdc.gov for pre-approval. Include the following information in the email**:**
   a. Brief clinical history
   b. Description of gross or histopathologic findings in the tissues to be submitted
   c. Listing of available formalin-fixed tissues

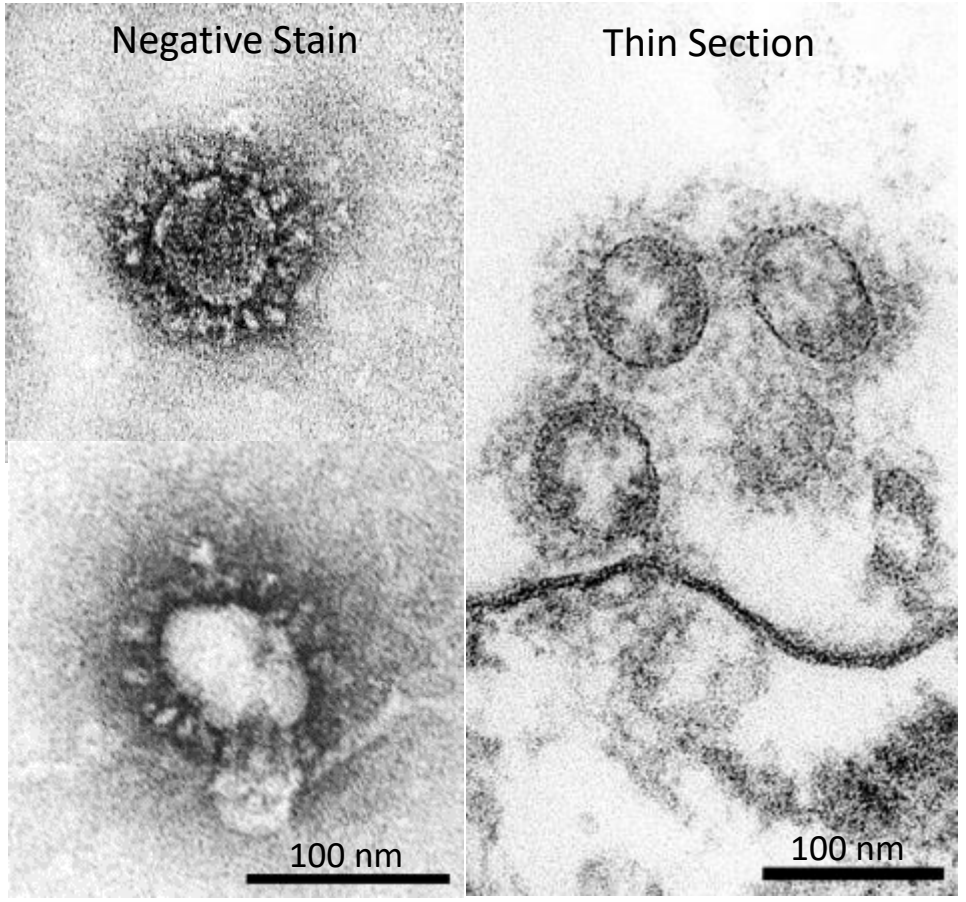
In your email correspondence, **do not** include patient identifiers such as name, date of birth, or medical record number. You must follow all applicable federal, state, tribal, local, and territorial regulations to adhere to patient confidentiality and privacy protections.

https://www.cdc.gov/coronavirus/2019-ncov/hcp/guidance-postmortem-specimens.html#submission-specimens

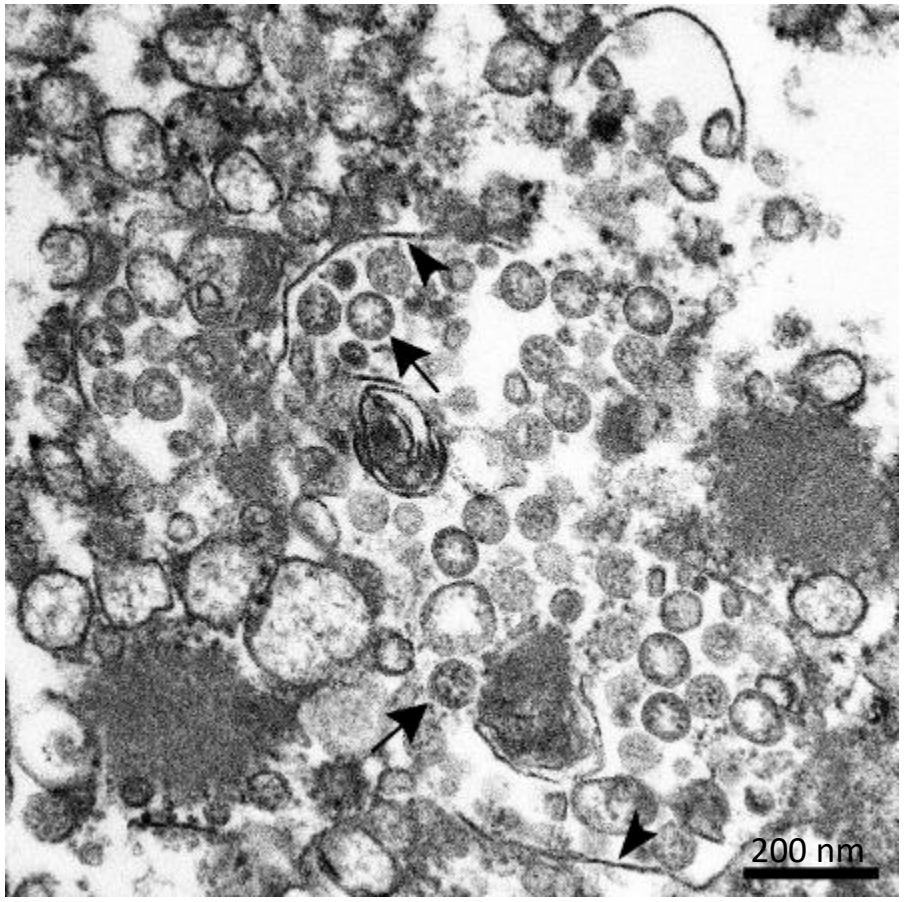
Ultrastructure Characteristics of Coronaviruses

- **Appearance**
  - Negative stain vs thin section
  - Generally spherical
  - Peplomers (spikes)
  - Cross sections through helical nucleocapsid
- **Size**
  - ~80 nm without spikes
  - ~100 nm with spikes
- **Cellular Location**
  - Bud through cisternae of endoplasmic reticulum-golgi complex
  - Found in membrane-bound vacuoles in the cytoplasm

Extracellular



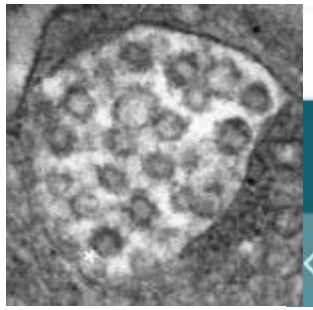
Intracellular



Arrows: coronavirus
Arrowheads: vacuolar membrane

Images from IDPB

Misidentification of Coronaviruses by EM



kidney INTERNATIONAL ISN 60 years

LETTER TO THE EDITOR | VOLUME 98, ISSUE 1, P228-231, JULY 01, 2020

Collapsing glomerulopathy in a COVID-19 patient

Sébastien Kissling [7] • Samuel Rotman [7] • Christel Gerber • ... Loic Lhopitallier • Salima Sadallah • Fadi Fakhouri [8] • Show all authors • Show footnotes

BJD British Journal of Dermatology
BRITISH ASSOCIATION OF DERMATOLOGISTS CENTENARY:
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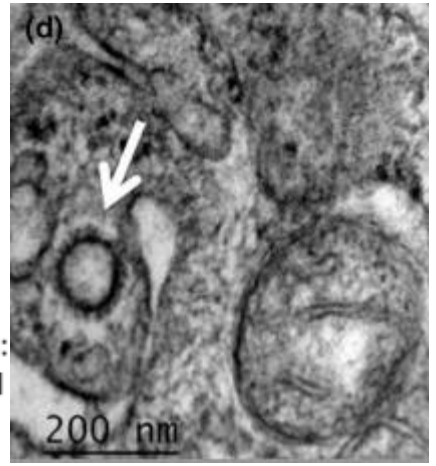
Paediatric Dermatology | Free Access

SARS-CoV-2 endothelial infection causes COVID-19 chilblains: histopathological, immunohistochemical and ultrastructural study of seven paediatric cases



Images in Obstetrics ajog.org

Visualization of severe acute respiratory syndrome coronavirus 2 invading the human placenta using electron microscopy

Gabriela N. Algarroba, MD; Patricia Rekawek, MD; Sevan A. Vahanian, MD; Poonam Khullar, MD; Thomas Palaia, MS; Morgan R. Peltier, PhD; Martin R. Chavez, MD; Anthony M. Vintzileos, MD

RAPID COMMUNICATION www.jasn.org

Ultrastructural Evidence for Direct Renal Infection with SARS-CoV-2

Evan A. Farkash,[1] Allecia M. Wilson,[1,2] and Jeffrey M. Jentzen[1,2]

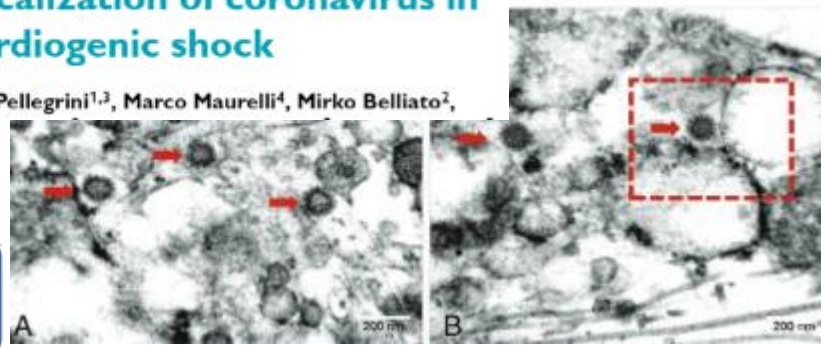
ESC European Society of Cardiology

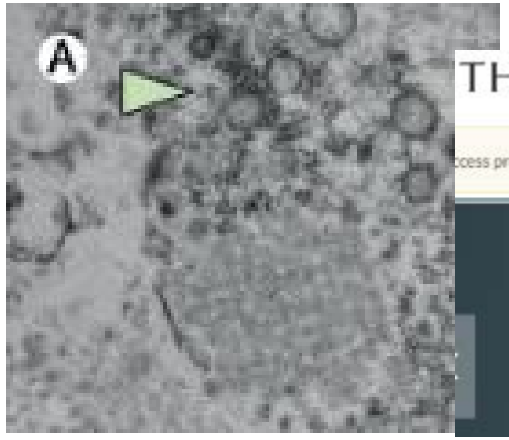
European Journal of Heart Failure (2020) 22, 911–915
doi:10.1002/ejhf.1828

CASE

Myocardial localization of coronavirus in COVID-19 cardiogenic shock

Guido Tavazzi[1,2], Carlo Pellegrini[1,3], Marco Maurelli[4], Mirko Belliato[2],





THE LANCET

ccess provided by Centers for Disease Control and Prevention

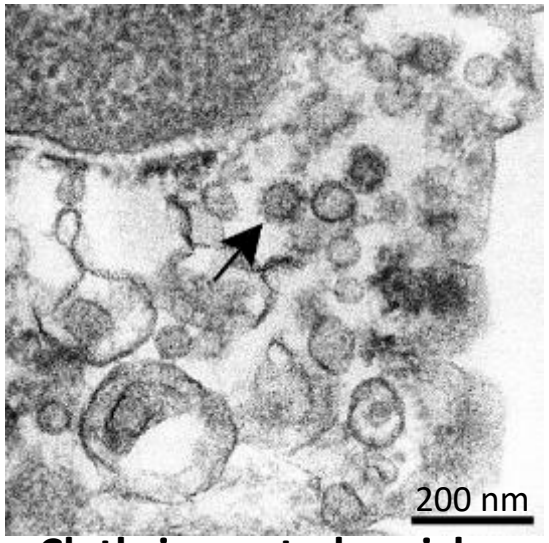
CORRESPONDENCE | VOLUME 395, ISSUE 10234, P1417-1418, MAY 02, 2020

Endothelial cell infection and endotheliitis in COVID-19

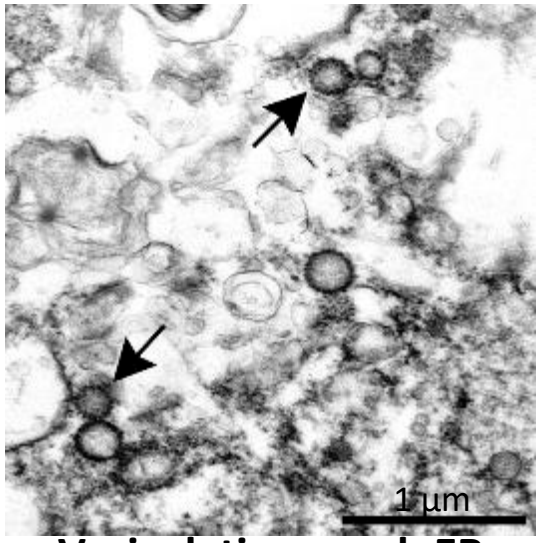
Zsuzsanna Varga • Andreas J Flammer • Peter Steiger • Martina Haberecker • Rea Andermatt • Annelies S Zinkernagel • et al. Show all authors

CDC

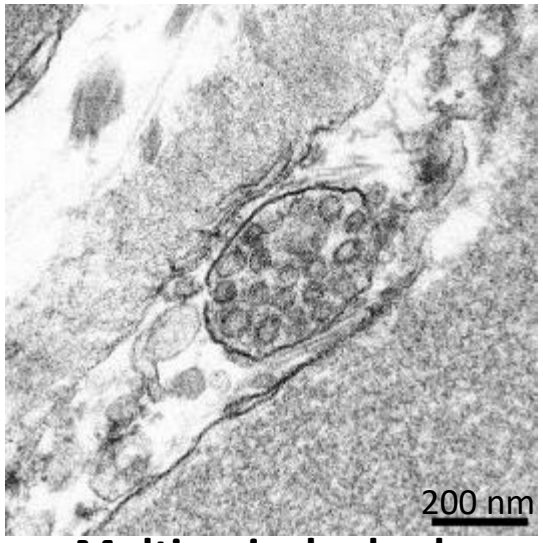
Structures Commonly Misidentified as Coronavirus



Clathrin-coated vesicles



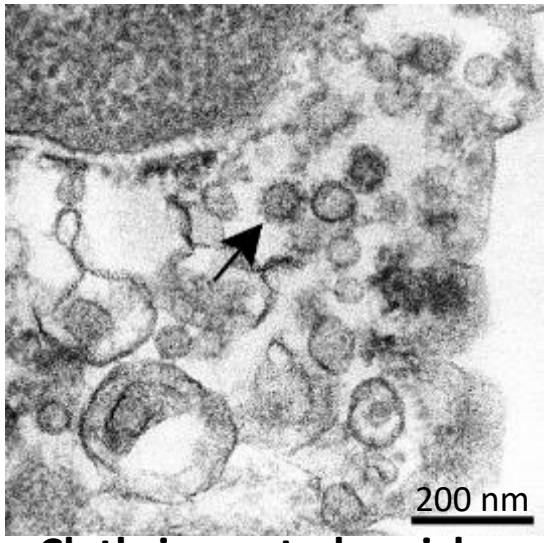
Vesiculating rough ER



Multivesicular body

Images from IDPB

Structures Commonly Misidentified as Coronavirus



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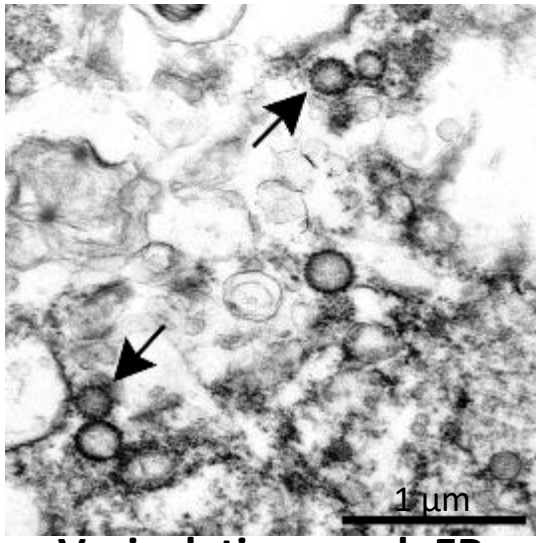

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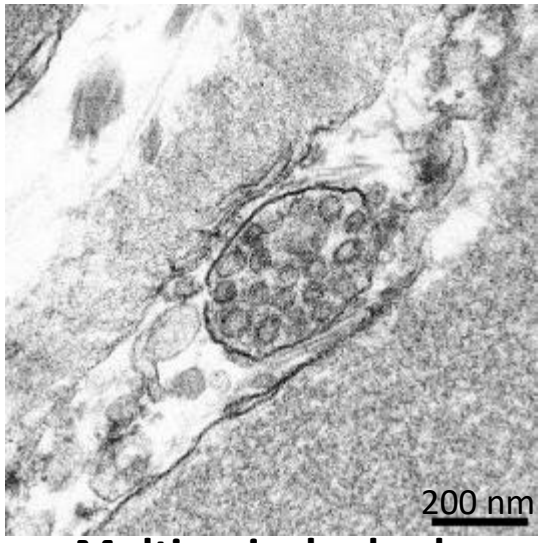

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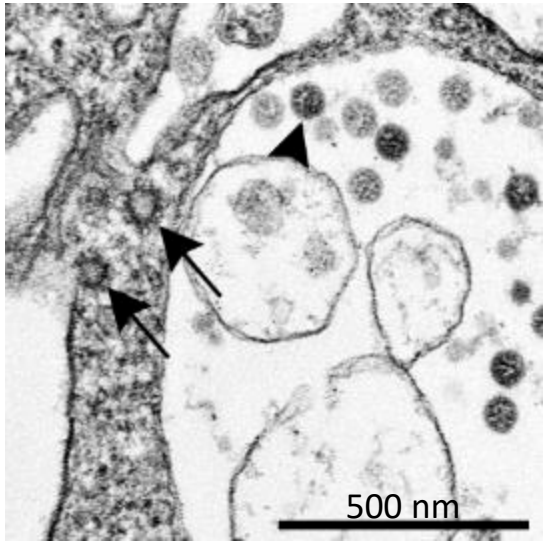
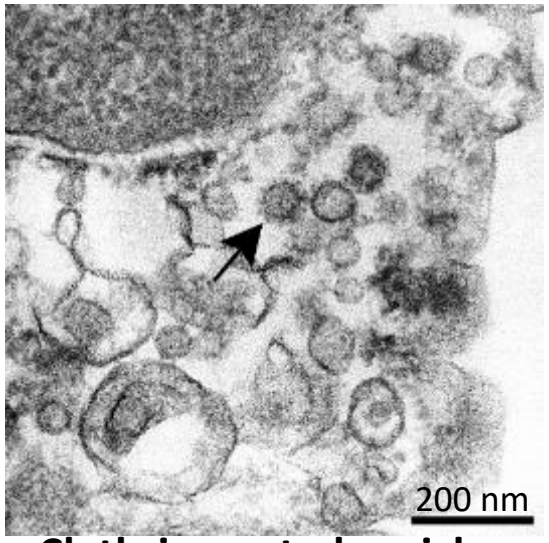


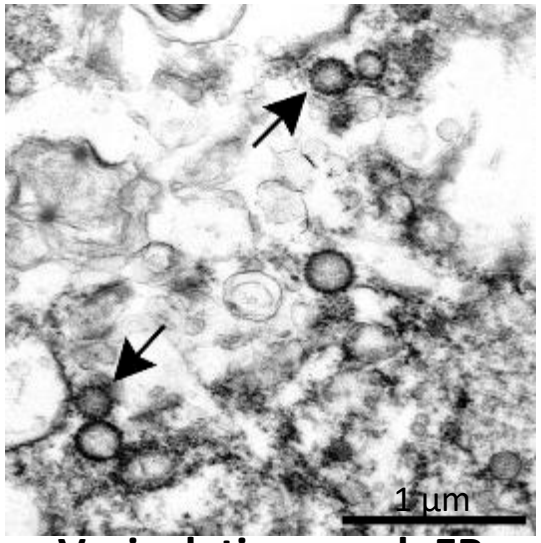
Clathrin-coated vesicles & viral particles

Images from IDPB

Structures Commonly Misidentified as Coronavirus



Clathrin-coated vesicles



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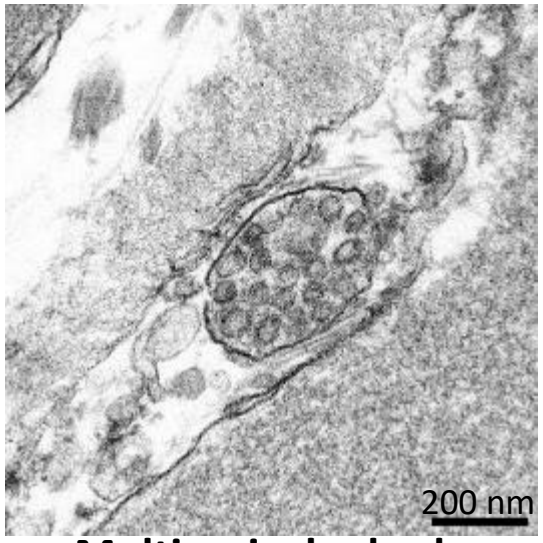
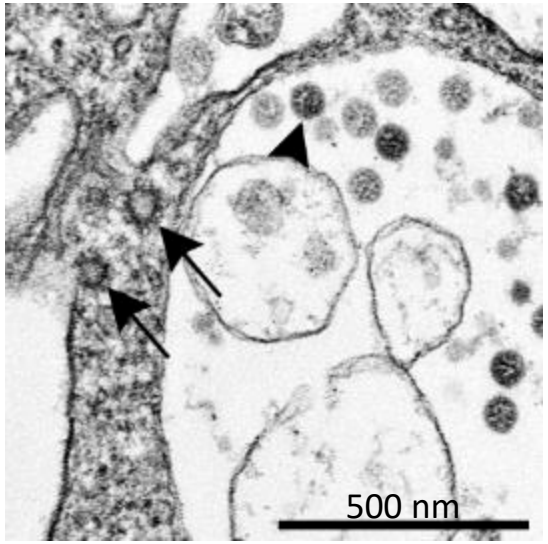
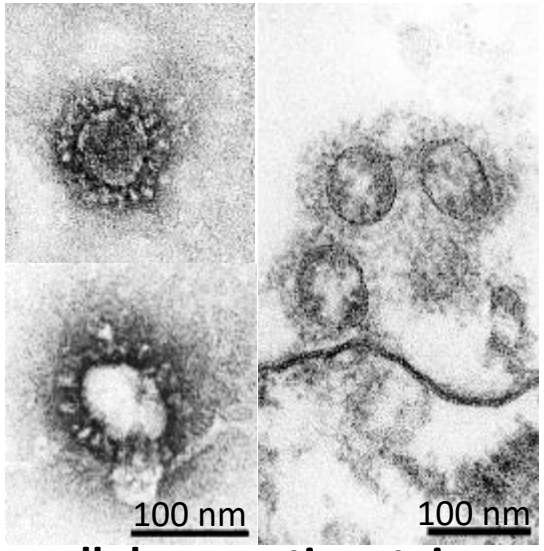


Multivesicular body



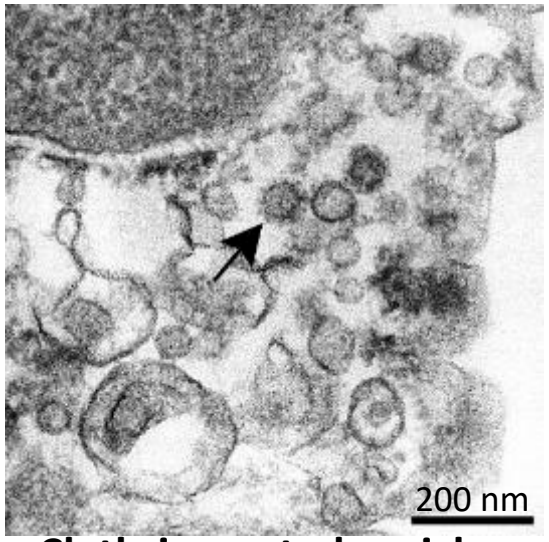
Clathrin-coated vesicles & viral particles



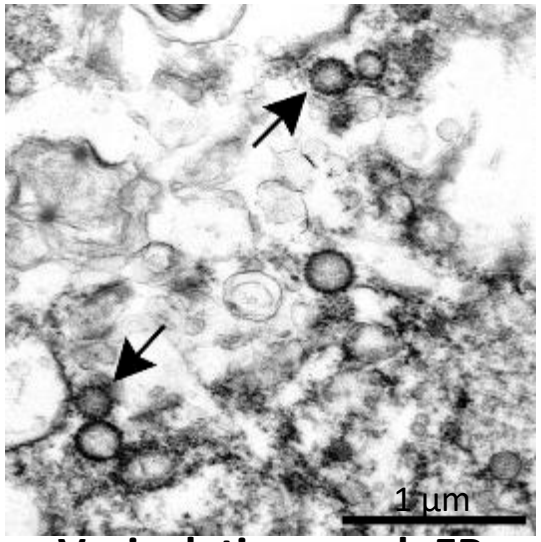
Extracellular negative stain and thin section viral particles

Images from IDPB

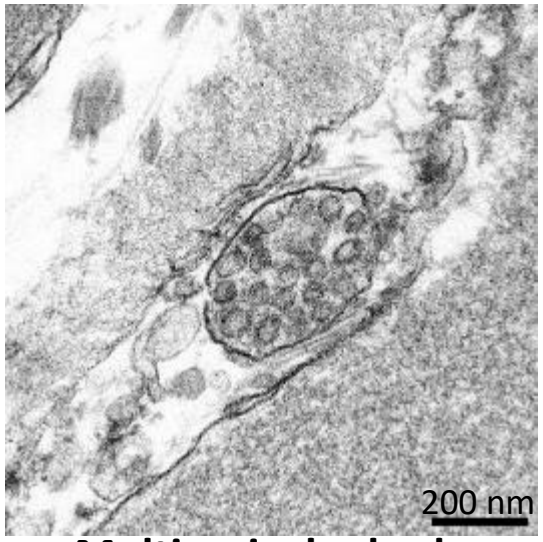
Structures Commonly Misidentified as Coronavirus



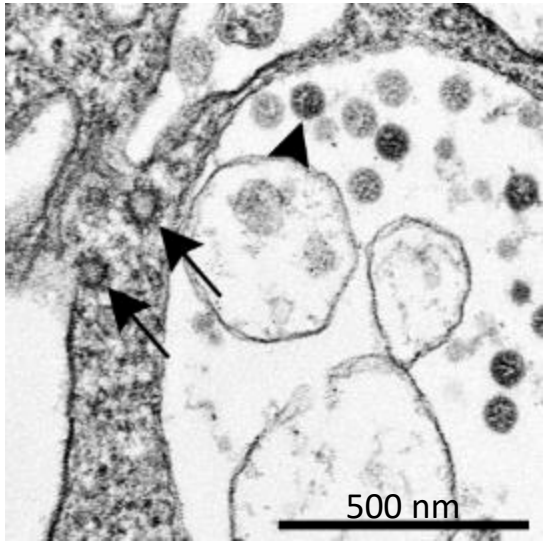
Clathrin-coated vesicles



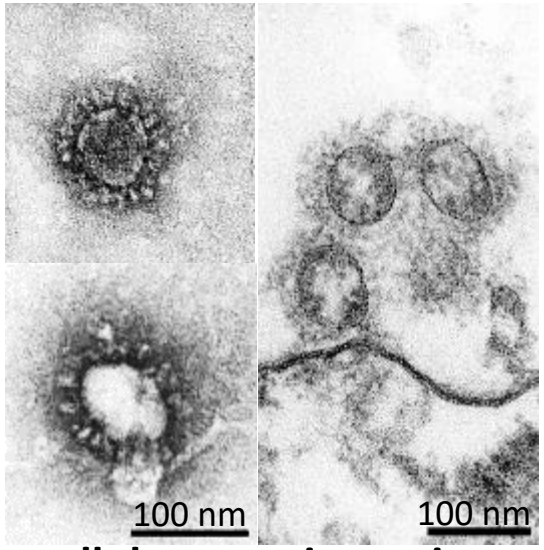
Vesiculating rough ER



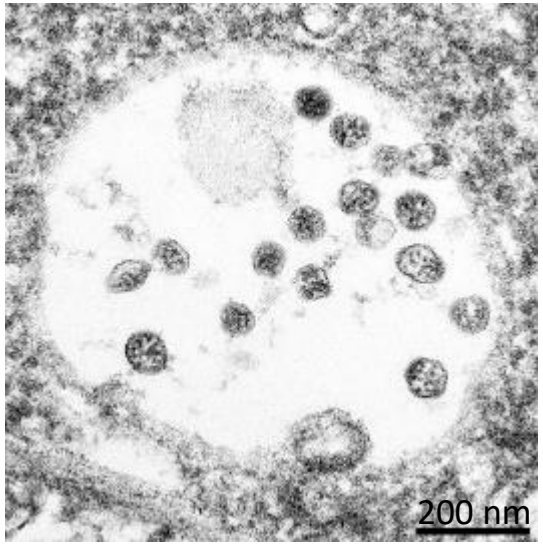
Multivesicular body



Clathrin-coated vesicles & viral particles



Extracellular negative stain and thin section viral particles



Vacuole with viral particles

Images from IDPB

Disclaimer

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

Q&A Panel

Ren Salerno, CDC Division of Laboratory Systems (DLS)

Jason Hall, CDC Division of Preparedness and Emerging Infections (DPEI)

Tim Stenzel, U.S. Food and Drug Administration (FDA)

Amy Zale, Centers for Medicare & Medicaid Services (CMS)

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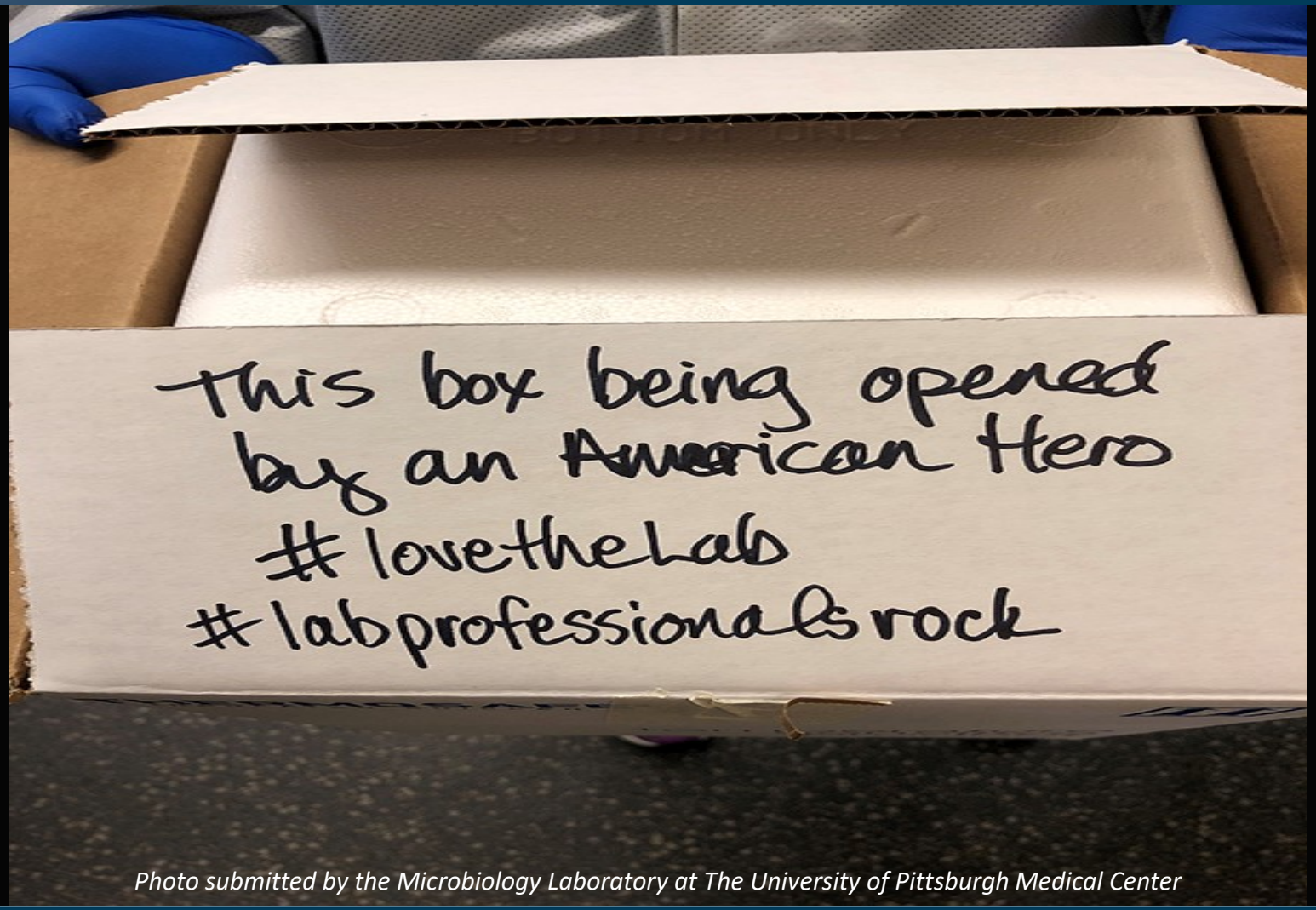

Photo submitted by the Microbiology Laboratory at The University of Pittsburgh Medical Center