CDC/IDSA COVID-19 Clinician Call

February 26, 2022

Welcome & Introductions

Dana Wollins, DrPH, MGC
Vice President, Clinical Affairs & Guidelines IDSA

- 85th in a series of calls, initiated by CDC as a forum for information sharing among frontline clinicians caring for patients with COVID-19. This call is not intended for the media.
- The views and opinions expressed here are those of the presenters and do not necessarily reflect the official policy or position of the CDC or IDSA. Involvement of CDC and IDSA should not be viewed as endorsement of any entity or individual involved.
- This webinar is being recorded and can be found online at www.idsociety.org/cliniciancalls.

Update on Serology Testing

CDC Update & Setting the Stage: The Use of Serology Testing to Guide Clinical Decision-Making

Adi Gundlapalli, MD, PhD
CDC COVID-19 Response Team
Chief Public Health Informatics Officer,
Center for Surveillance, Epidemiology, and Laboratory Services
U.S. Centers for Disease Control and Prevention

FDA Update

Ryan Karsner, MD
Medical Officer, Division of Microbiology Devices
Office of In Vitro Diagnostics and Radiological Health
Center for Devices and Radiological Health
U.S. Food and Drug Administration

Patterns of Testing at Mayo Clinic

Elitza S. Theel, PhD, D(ABMM)
Director, Infectious Diseases Serology Laboratory
Professor, Laboratory Medicine and Pathology
Mayo Clinic

The Clinical Perspective: Using Serology Test To Guide Clinical Decision-Making

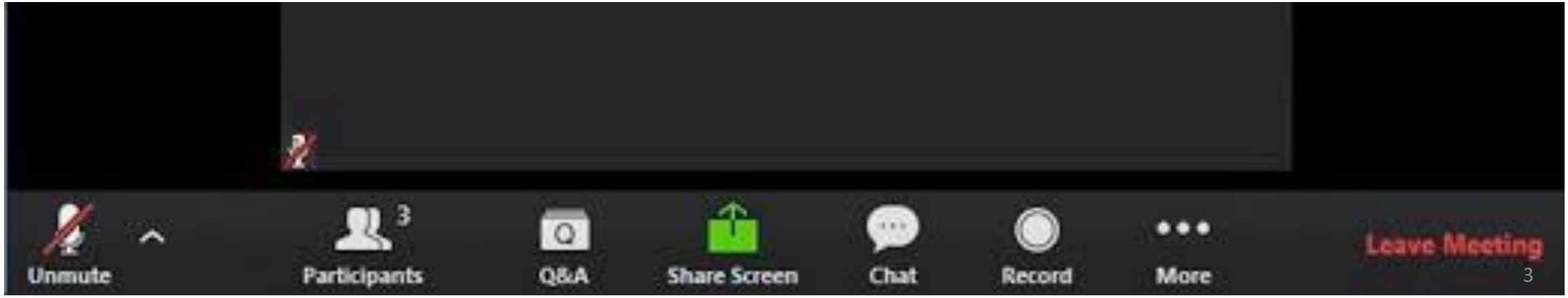
Ghady Haidar, MD
Director of Research, Bone Marrow Transplant and Hematological Malignancy Infectious Diseases
Program Director, Transplant Infectious Diseases Fellowship Program
University of Pittsburgh

Key Considerations & Future Directions in Serology Testing

Florian Krammer, PhD
Mount Sinai Professor in Vaccinology
Icahn School of Medicine at Mount Sinai

Question?
Use the “Q&A” Button

Comment?
Use the “Chat” Button



CDC Update & Setting the Stage: The Use of Serology Testing to Guide Clinical Decision-Making

Adi Gundlapalli, MD, PhD

Disclosures:

Nothing to Disclose

FDA Update

Ryan Karsner, MD

Disclosures:

Nothing to Disclose

EMERGENCY USE AUTHORIZATION OF COVID-19 SEROLOGY TESTS

February 26, 2022

Ryan Karsner, MD
Medical Officer, Division of Microbiology Devices
Office of In Vitro Diagnostics and Radiological Health
Center for Devices and Radiological Health
U.S. Food & Drug Administration

EUA LAW AND SEROLOGY INTENDED USE

- Federal Food, Drug, and Cosmetic Act section 564(b)(1)(A-C):
  - "The product may be effective…" AND
  - "…the known and potential benefits of the device when used for that purpose outweigh the known and potential risks of the device."
- SARS-CoV-2 serology intended use statements:
  - "an aid in identifying individuals with an adaptive immune response to SARS-CoV-2, indicating recent or prior infection."

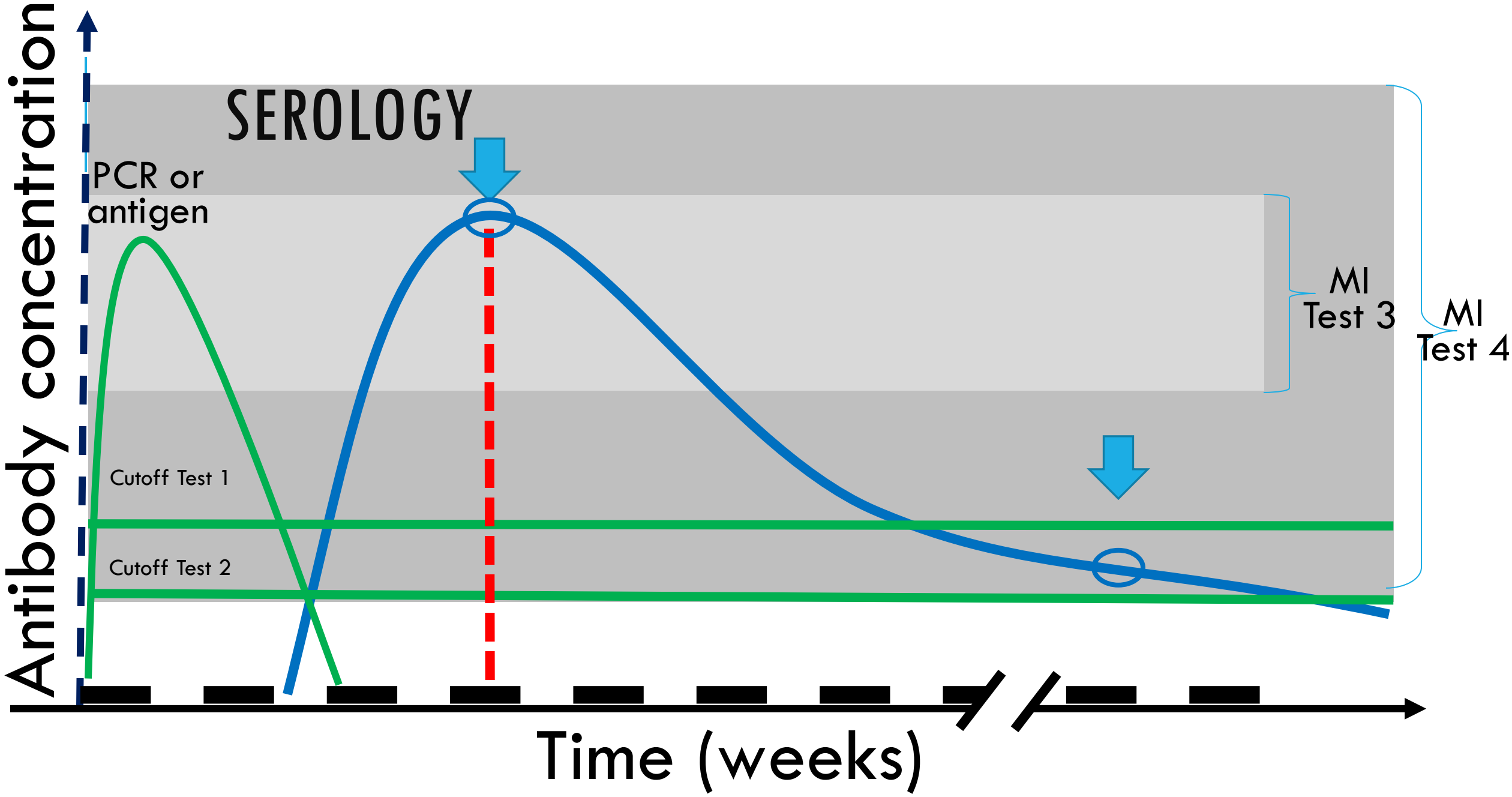
COVID SEROLOGY TESTS OVERVIEW

85 Serology tests including

- 13 Point-of-care
- 2 Neutralizing antibody tests
- 1 Quantitative
- 17 Semi-quantitative

CURRENT LIMITATIONS OF SARS-COV-2 SEROLOGY TESTING

- Circulation of antigenically distinct viruses with ongoing viral mutation – likely impacts immune protections and limits any current data being applied to new mutations and variants
- Lack of traceability to a standardized reference material – only one test reports out in BAU or IU and most studies do not use this assay


Antibody concentration
SEROLOGY
PCR or antigen
MI Test 3
MI Test 4
Cutoff Test 1
Cutoff Test 2
Time (weeks)

CURRENT LIMITATIONS OF SARS-COV-2 SEROLOGY TESTING (CONTINUED)

- Clinical validation studies
  - No standard molecular reference test which test developers can use as a comparator test
  - Relatively wide confidence intervals around performance point estimates
  - Lack of prospective studies where retrospective studies introduce biases by subject enrollment that artificially inflate performance point estimates
- Correlates of protection & clinically relevant thresholds are lacking
- Role of other components of the adaptive immune system such as T cells

FDA RESOURCES

- In Vitro Diagnostics EUAs
  - (templates with validation recommendations and authorized tests)
- Coronavirus Disease 2019 (COVID-19) Emergency Use Authorizations for Medical Devices
- FAQs on Testing for SARS-CoV-2

Patterns of Testing at Mayo Clinic

Elitza S. Theel, PhD, D(ABMM)

Disclosures: Serviced on Advisory Boards for:
Euroimmun US
Oxford Immunotec
Roche Diagnostics
Serimmun Inc

MAYO CLINIC

SARS-CoV-2 Serologic Testing Patterns

An Academic Medical Center and National Reference Laboratory Perspective

Elitza (Elli) S. Theel, PhD, D(ABMM)
Director, Infectious Diseases Serology Laboratory
Professor, Laboratory Medicine and Pathology
Mayo Clinic
Rochester, MN
@ElliTheelPhD

February 26, 2022

DISCLOSURES

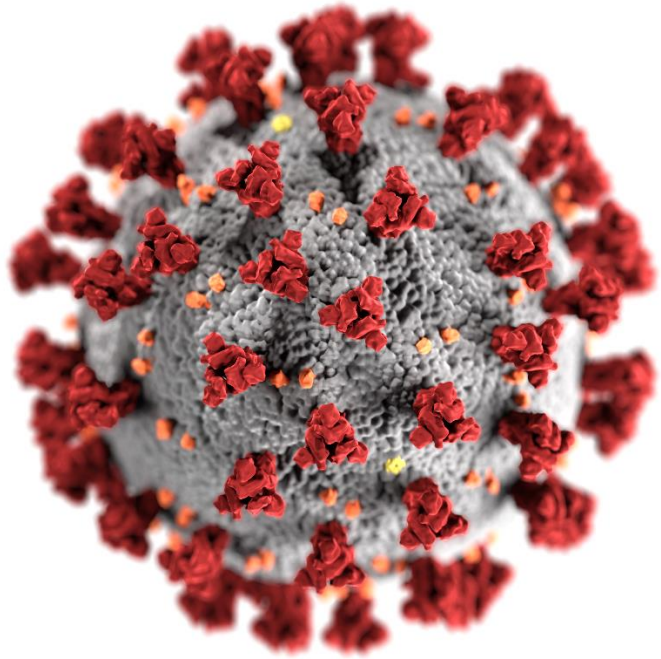
- Advisory Board
  - Euroimmun US
  - Oxford Immunotec
  - Roche Diagnostics
  - Serimmun Inc.

LEARNING OBJECTIVES

- Summarize local and national serologic testing patterns over the past 2 years
- Discuss current (limited) role of serologic test for clinical decision purposes at Mayo Clinic
- Provide perspective on the ideal SARS-CoV-2 serologic testing state

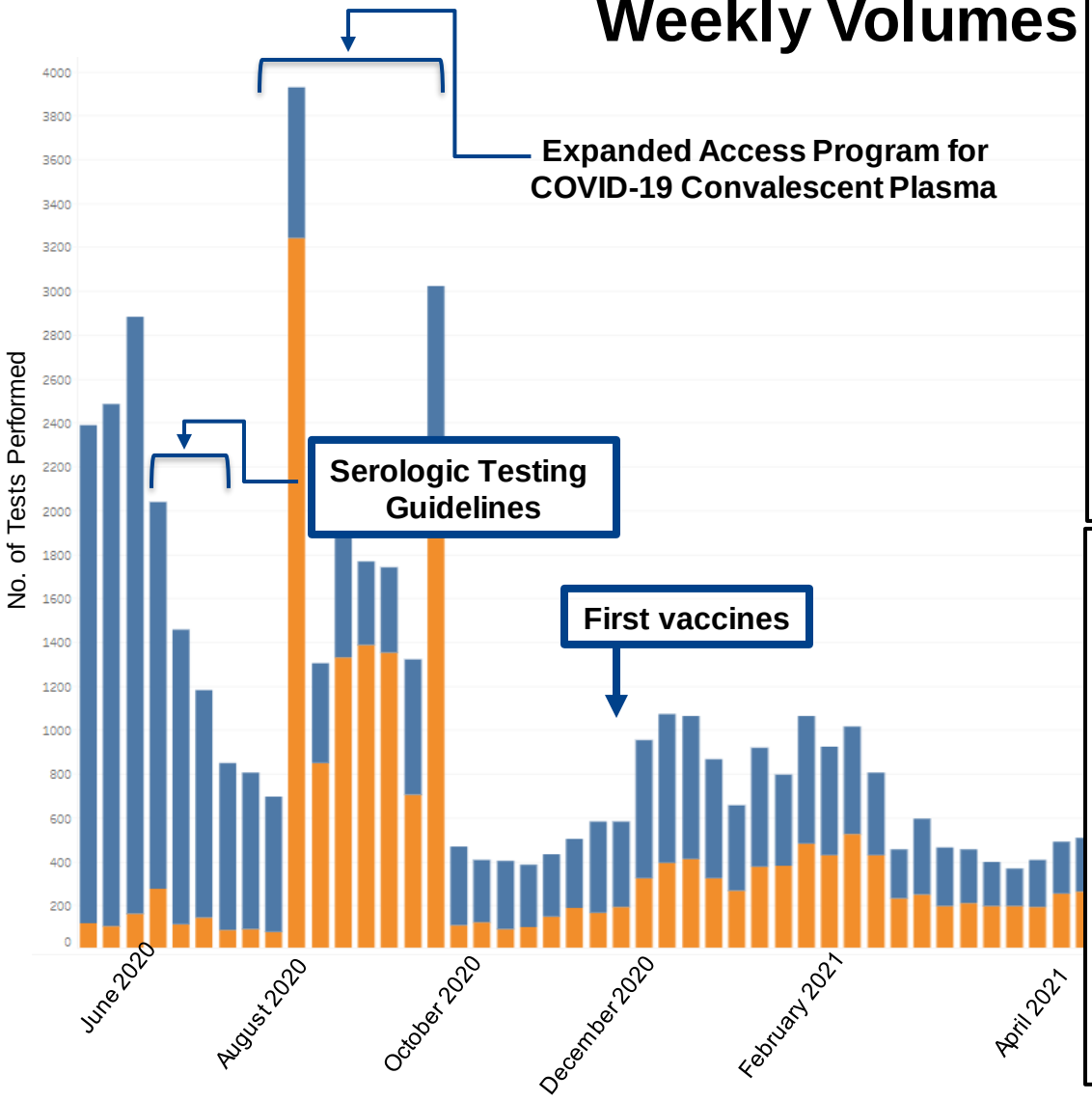
SARS-CoV-2 Serologic Testing at Mayo Clinic

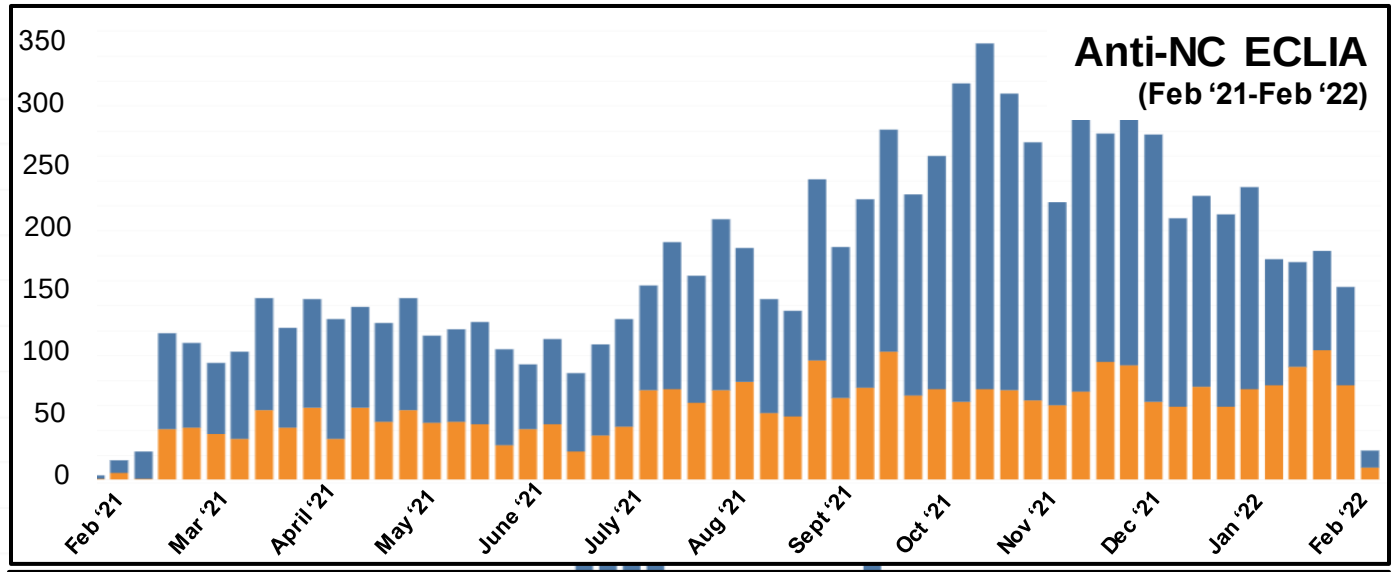
- Our SARS-CoV-2 serologic testing journey
  - Started testing April 10, 2020
  - Implemented 6 different high-throughput assays for serum and/or dried blood spots
  - February 2021: Standardized to offer 2 SARS-CoV-2 serologic assays
    - Semi-quantitative, anti-spike total antibody electrochemiluminescent immunoassay (ECLIA)
    - Qualitative, anti-nucleocapsid total antibody ECLIA
- Testing available to the Mayo Clinic practice and through Mayo Clinic Laboratories

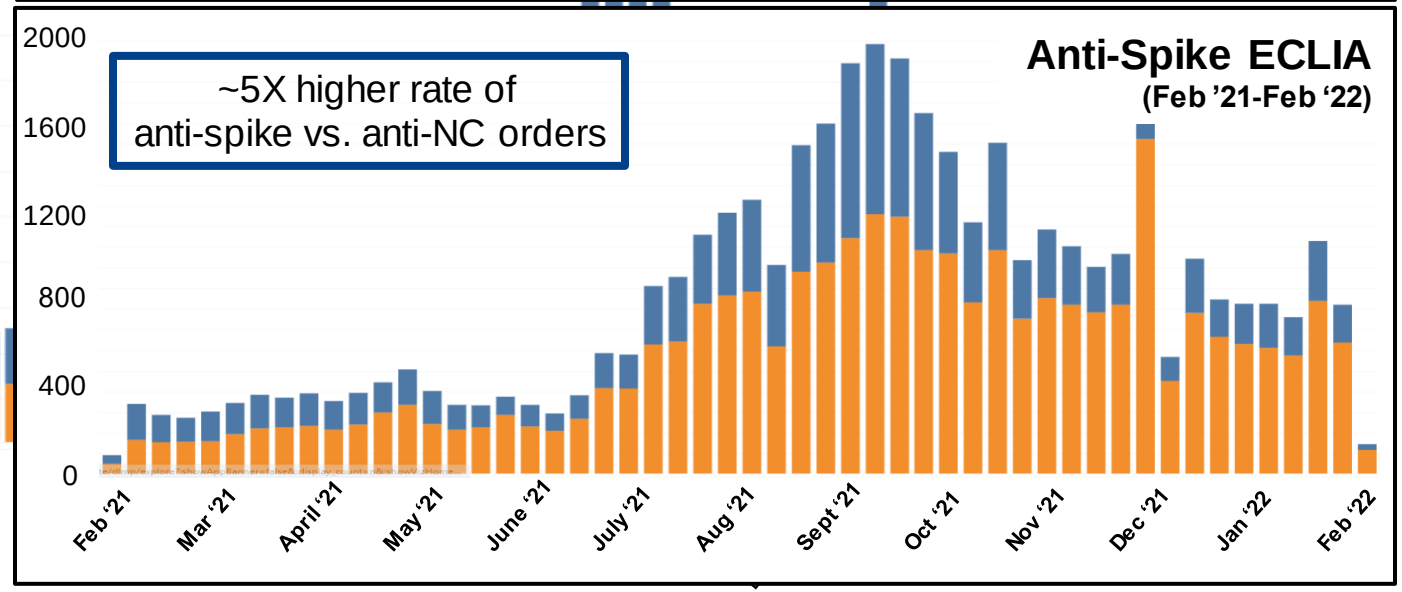


General Testing Patterns – Birds Eye View at the National Level

Weekly Volumes

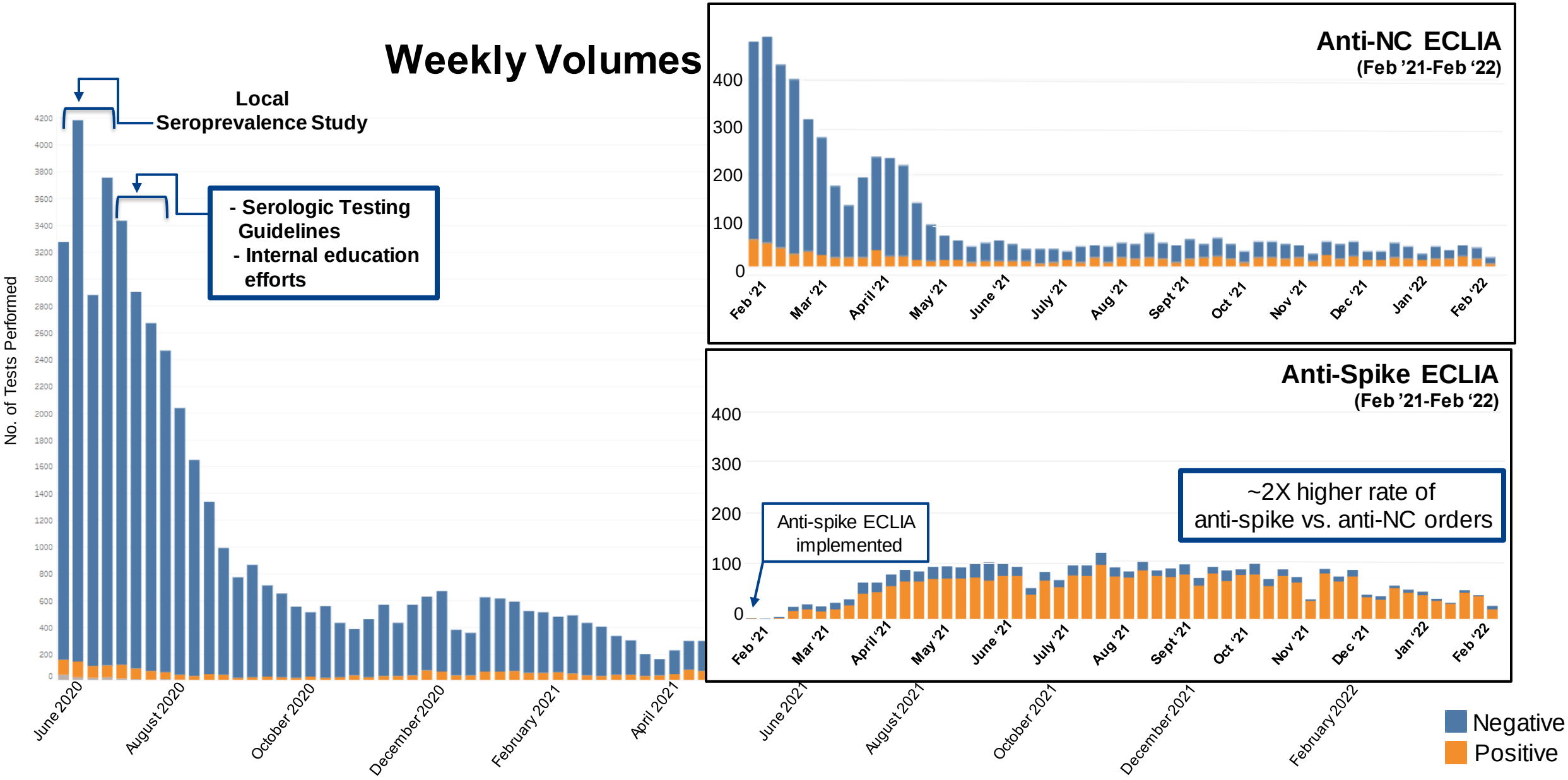






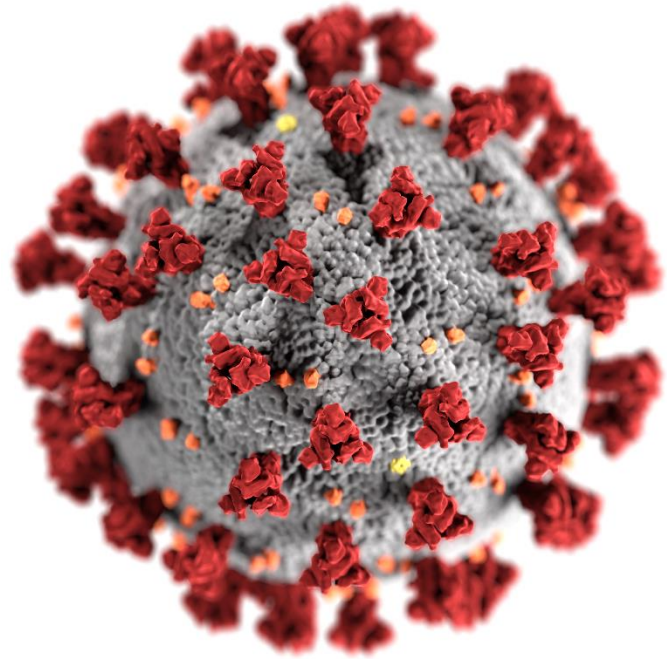
General Testing Patterns – Mayo Clinic, Rochester

Weekly Volumes



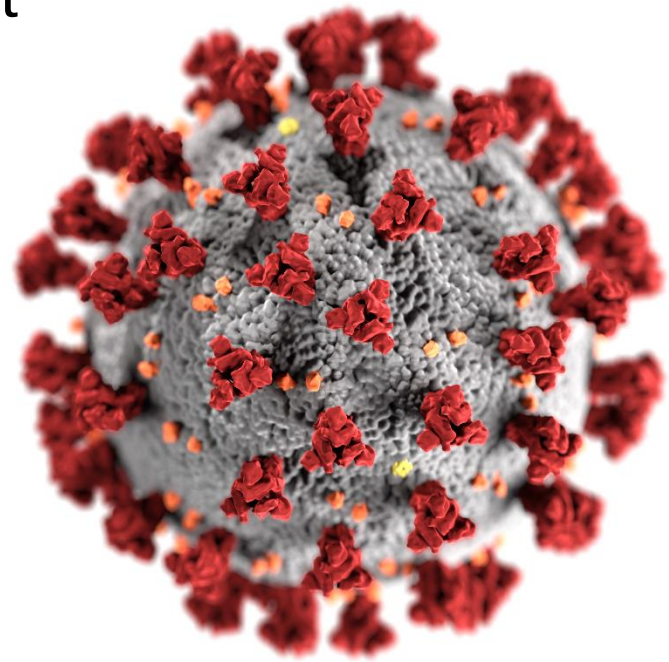
Use of Serologic Testing at Our Institution

- Currently performing <100 tests/week
  - Anti-spike > Anti-nucleocapsid testing
- Limited use for clinical decision-making purposes
  - Evaluation of late complications of COVID-19
  - Diagnosis of COVID-19 in PCR-negative patients presenting later in disease course
  - Not used for pre- or post- exposure prophylaxis decisions
- Ordered for clinical interest in immunosuppressed patients and/or patient request

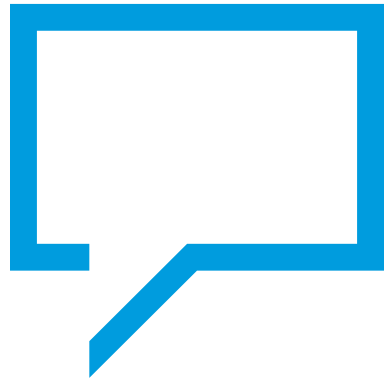


The Ideal SARS-CoV-2 Serologic Testing State for Clinical Laboratories

- Serologic result leads to an actionable, clinical decision point
- Identification of serologic correlate(s) of protection
- Assay Standardization
  - Ig class detected
  - SARS-CoV-2 target antigen
  - Reporting, particularly for quantitative assays
    - Calibration to international Ig standard (e.g., WHO/NIBSC 20/136)
  - Calibration of quantitative assays to the protective correlate



Thank You



The Clinical Perspective: Using Serology Test to Guide Clinical Decision-Making

Ghady Haidar, MD

Disclosures: Research Support

Karius, Inc
Allovir, Inc

The Clinical Perspective: Using Serology Tests to Guide Clinical Decision Making (?)

Ghady Haidar MD

Assistant Professor of Medicine

Division of Infectious Diseases

Transplant ID Program

February 26, 2022

University of Pittsburgh

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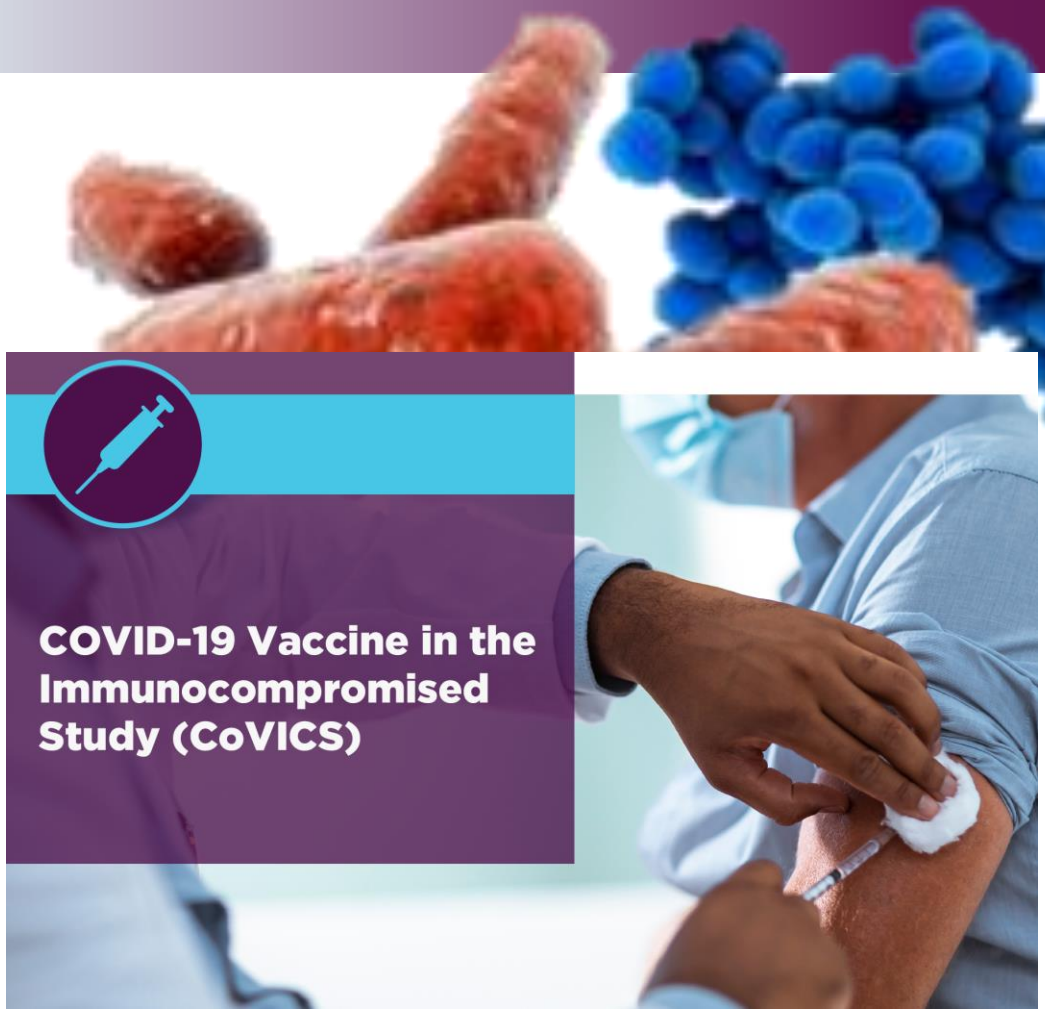
Ghady Haidar MD

@cleverwebber

Disclosures (research support)

- Karius, Inc
- Allovir, Inc

Outline



Pre-exposure prophylaxis (PrEP) of COVID-19 using monoclonal antibodie

COVICS

- 1271 participants (April – July 2021)
  - **1099 immunocompromised**
    - SOT, cancer, autoimmune, persons with HIV
  - **172** non-immunocompromised UPMC **HCW**
- Blood **2+ weeks** after "full vaccination"
  - **Seropositivity** (Beckman, IgG to SARS-CoV-2 Spike RBD (≥ 1))
    - Available in EMR, **free**
  - **Factors associated with + IgG**
  - Comparison with **Bio-Rad** (IgG to RBD)
  - Pseudovirus **neutralization**

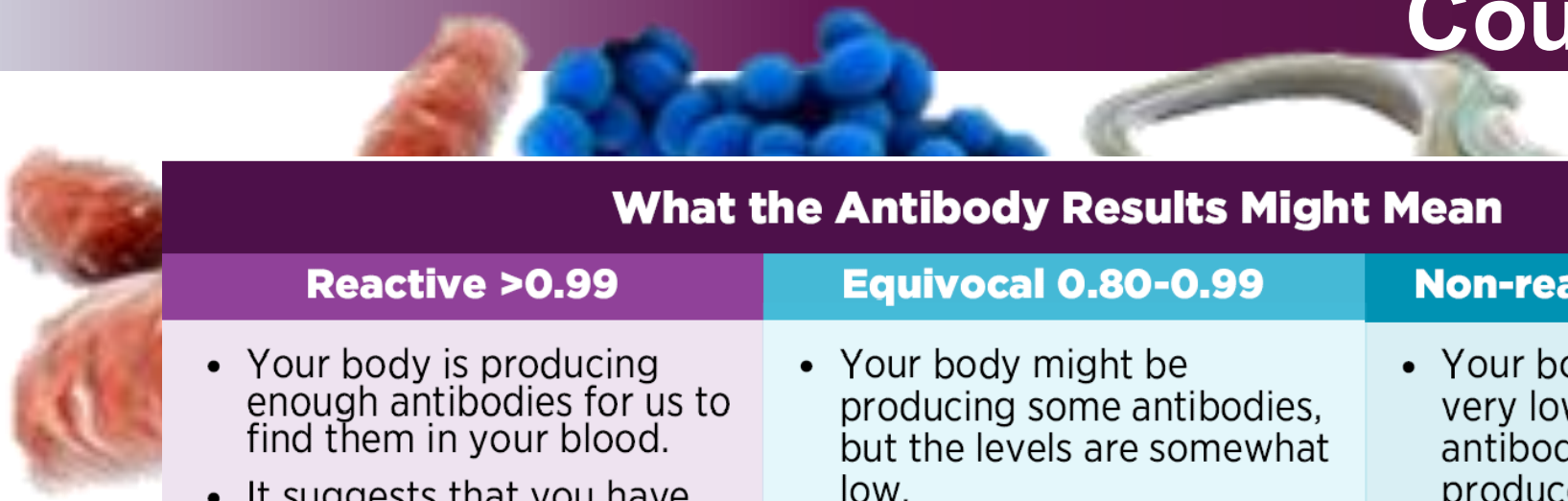
UPMC Hospital Labs

- **UPMC Altoona (Station Medical Center)** - Patient Access, 1st floor
- **UPMC Bedford** - Patient Access, 1st floor
- **UPMC East** - Outpatient Testing Center, 1st floor
- **UPMC Hamot*** - Front Desk, Main Entrance
- **UPMC Horizon-Greenville** - Outpatient Center, 1st floor
- **UPMC Horizon-Shenango Valley** - Outpatient Center, 1st floor
- **UPMC Jameson** - Patient Access, Outpatient Entrance
- **UPMC Magee-Womens Hospital*** - Patient Access, Main Entrance
- **UPMC McKeesport*** - Outpatient Testing Center, D Level Mansfield
- **UPMC Mercy*** - Outpatient Testing, Room 1-106
- **UPMC Northwest** - Front Desk, Main Entrance
- **UPMC Passavant-Cranberry** - Information Desk, Main Entrance
- **UPMC Passavant-McCandless** - Information Desk, Main Entrance
- **UPMC Presbyterian, UPMC Montefiore*** - Diagnostic Testing, Room NE 550, 5th floor, **or Falk*** - Front Desk, Suite 200
- **UPMC Shadyside*** - Outpatient Testing Center, Suite 118, **including UPMC Hillman Cancer Center**
- **UPMC St. Margaret** - Entrance A

*Parking fees may apply.

Haidar et al, Clin Infect Dis 2022

Counseling materials



What the Antibody Results Might Mean

Reactive >0.99	Equivocal 0.80-0.99	Non-reactive 0.00-0.79
• Your body is producing enough antibodies for us to find them in your blood. • It suggests that you have some protection against COVID-19 from the vaccine. However, if you have a weak immune system, this level of protection may not be the same as that of a person with a healthy immune system. • We do not know what the different numbers mean. We do know that any result greater than 0.99 is reactive.	• Your body might be producing some antibodies, but the levels are somewhat low. • We do not know if you have the same protection against COVID-19 from the vaccine as that of a person with a healthy immune system.	• Your body either produced very low levels of antibodies or did not produce any antibodies to the vaccine. • It suggests that you do not have the same protection against COVID-19 from the vaccine as that of a person with a healthy immune system.

It is IMPORTANT for everyone, regardless of antibody result, to:

- Protect yourself and others by masking and physical distancing.
- Encourage those around you to protect **YOU** by getting vaccinated, masking, and physical distancing.

Healthcare workers (N= 172)	**92.4%**
(N= 94)	**79.8%**
(N= 163)	**79.1%**
(N= 136)	**78.7%**
(N= 156)	**50.0%**
(N= 450)	**30.7%**

Andrew Bilderback, MS
Statistician, UPMC Wolff Center

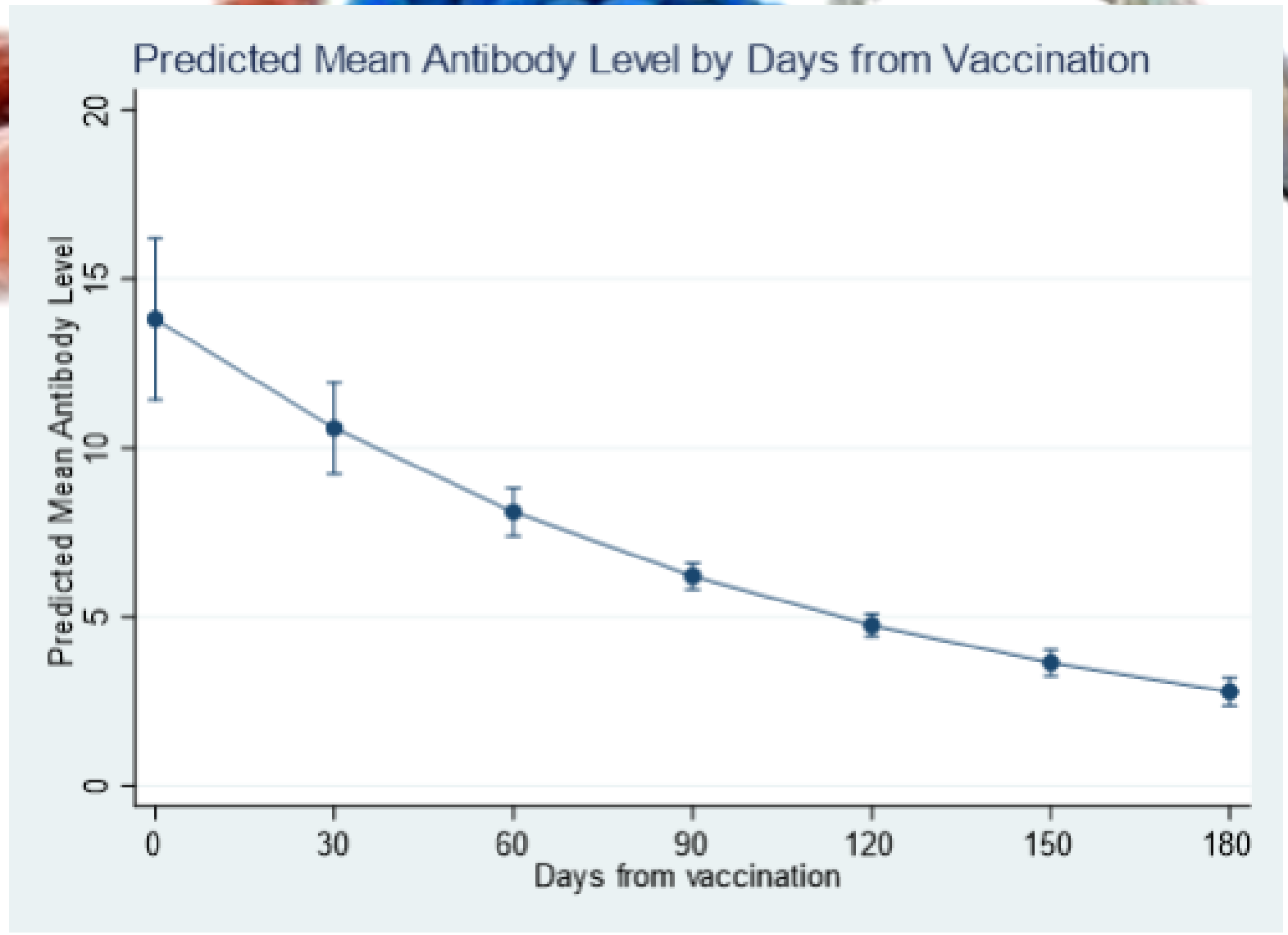
Haidar et al, Clin Infect Dis 2022

Who is less likely to have a positive IgG?*

HCW	SOT	Autoimmune	Cancer	HIV
Longer interval from vaccination	• Age > 45 • BNT162b2 (vs mRNA-1273) • Lung transplant • Within 1 year of SOT • On 2+ immunosuppressive drugs (regardless of class)	• BNT162b2 (vs mRNA-1273) • Longer interval from vaccination • Anti-CD20 mAB	• Age > 60 • BNT162b2 (vs mRNA-1273) • Anti-CD20 mAB	CD4 < 200

***Analyses adjusted for confounders**

Antibody levels decline over time



1.55 level decline per month since vax

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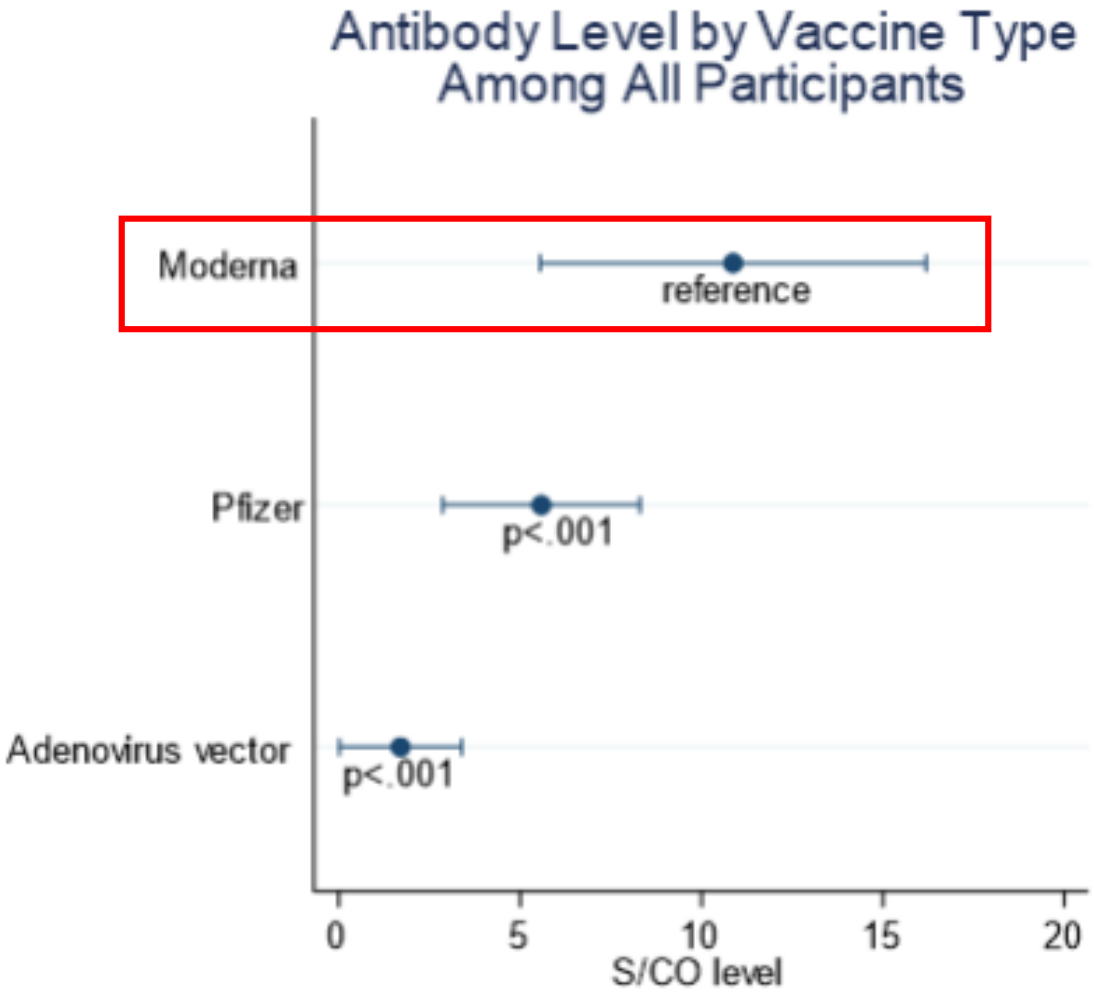
Vaccine type vs antibody level



- **Levels with Moderna >>>> levels with other vaccines,** after adjusting for age, time since vaccination, and underlying conditions
- All subgroups
- Dose?
- Interval?

Haidar et al, Clin Infect Dis 2022

50

40

kman)

S m

Urvi M Parikh, PhD

Infectious Diseases

Associate Director, Microbicides Trials Network (MTN)

Associate Director, Virology Core Laboratory

Amy Heaps, MS

.9

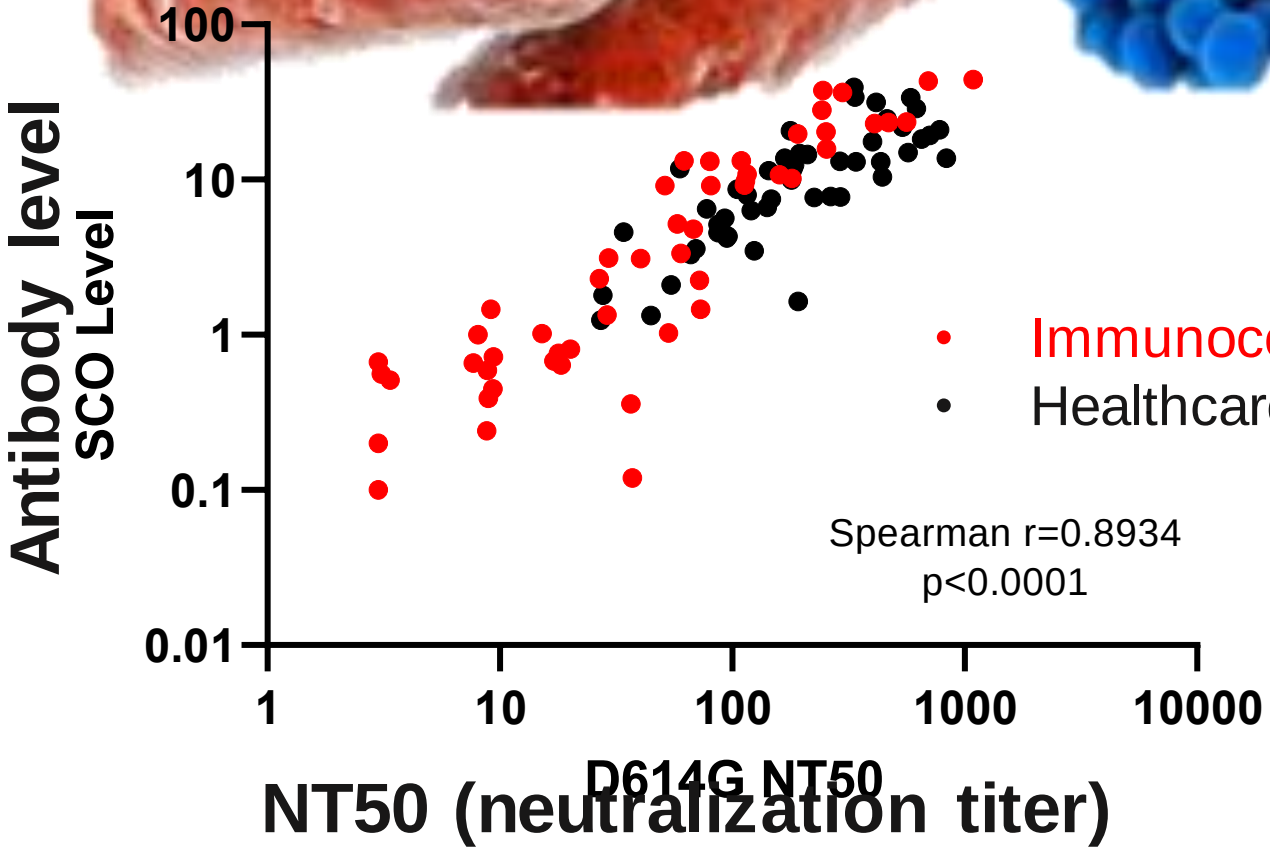
Haidar et al, Clin Infect Dis 2022

Antibody level vs NT50 (N=100)

Spearman correlation of antibody level
D614G NT50 and S/CO levels

Michele Sobolewski

Nathan Enick



- Excellent correlation between level and NT50
- Overall, **higher antibody level = greater neutralization of virus**

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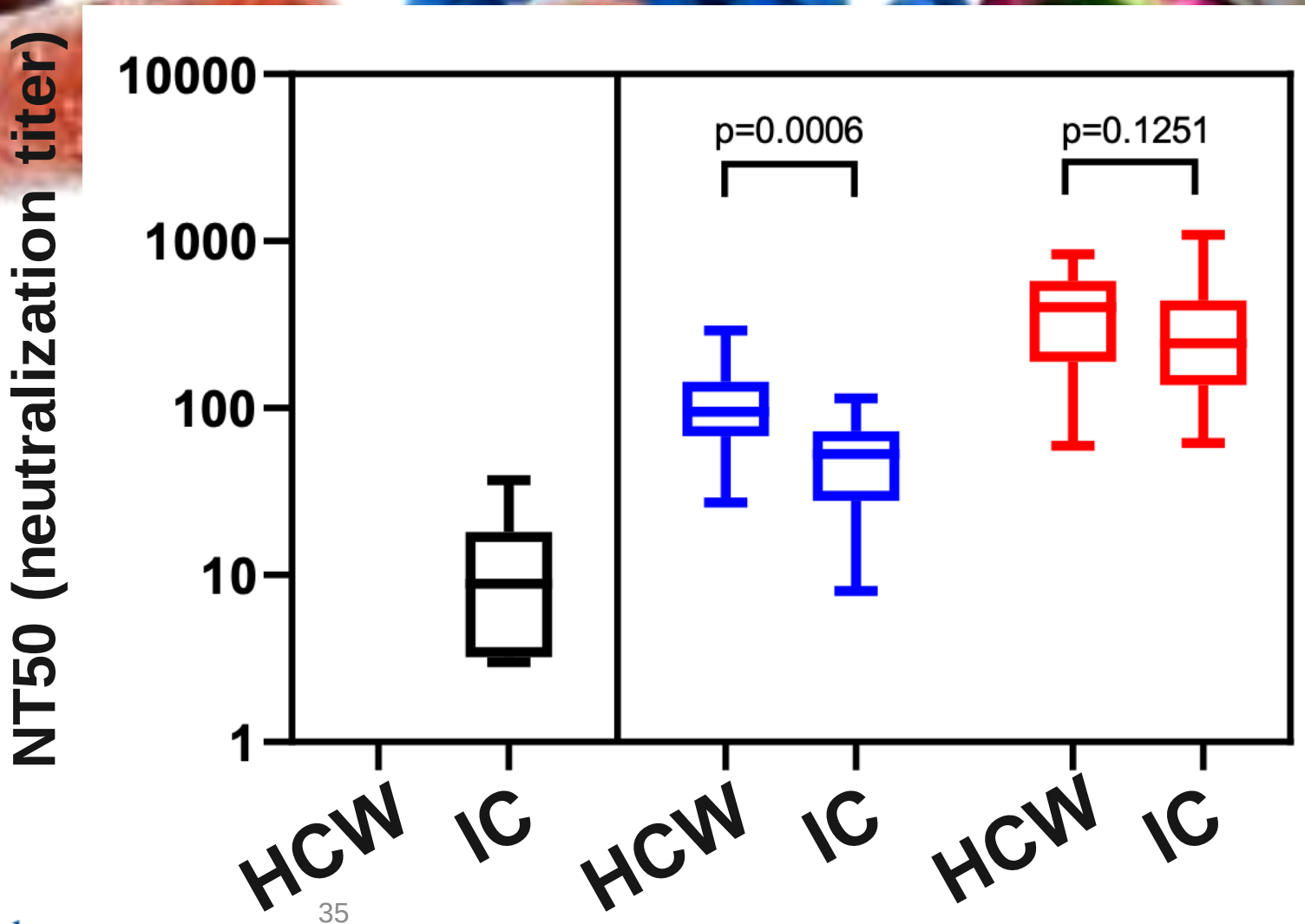
Antibody level vs NT50

- Neutralization ability LOWER in IC vs HCW with antibody levels 1-10



- **IC:** immunocompromised
- **HCW:** healthcare workers

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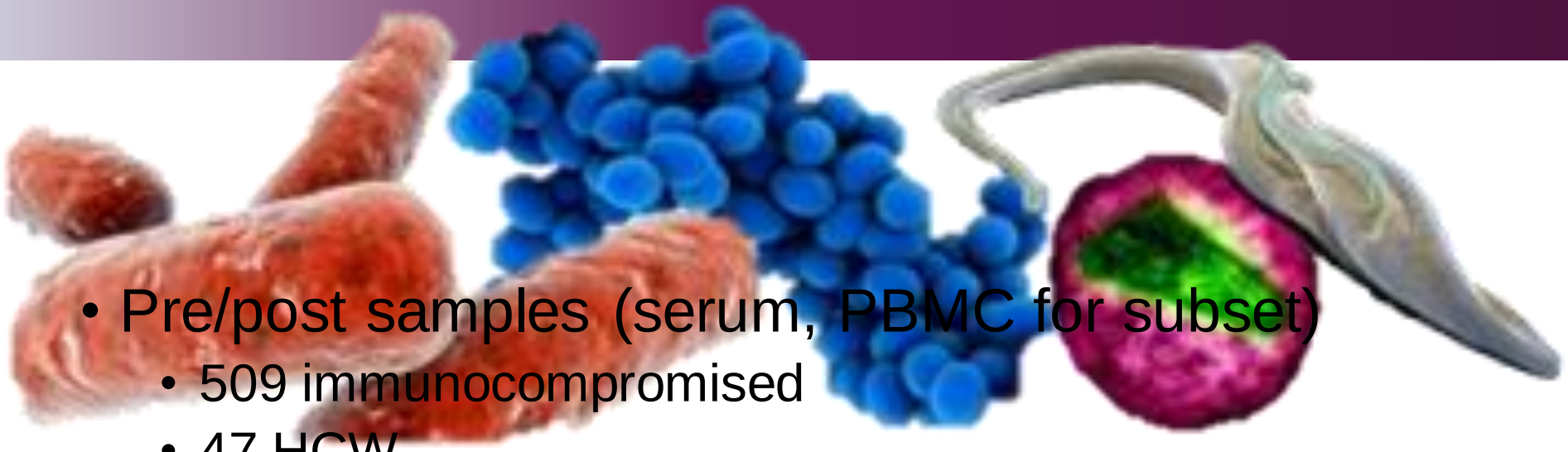
Sneak peak



- Pre/post samples (serum, PBMC for subset)
  - 509 immunocompromised
  - 47 HCW
- Most “homologous” (Moderna-to-Moderna or Pfizer-to-Pfizer)
- Among IC:
  - **29.9%: levels still < 1**
  - 54.2%: levels still 1-10
- T-cell responses underway

Utility of checking antibody levels

Antibody Testing Is Not Currently Recommended to Assess Immunity After COVID-19 Vaccination: FDA Safety Communication

Date Issued: May 19, 2021

FDA U.S. FOOD & DRUG ADMINISTRATION

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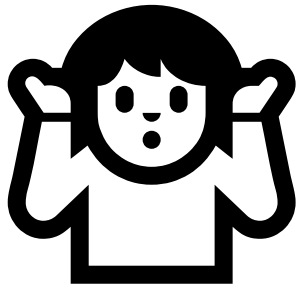
What are we doing?

- Not routinely checking
- Using data COVICS for counseling
- Cutoffs of protection in a changing pandemic?
  - Worried that patients will modify behavior
- Which lab to “trust”?
- “Snapshot” in time
- Insurance coverage

Patient email

the expert in these matters, I will ask you: Am I correct it reading the test as telling me that the titers have gone from 16.20 to 1627.0 since I stopped my immunosuppresive meds and received a 50% 4th dose of Moderna?



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Labcorp

Pre-exposure prophylaxis (PrEP) of COVID-19

Tixagevimab Cilgavimab PrEP

Expectation (EUA)

Medical conditions or treatments that may result in moderate to severe immune compromise and an inadequate immune response to COVID-19 vaccination include but are not limited to[1]:

- Active treatment for solid tumor and hematologic malignancies
- Receipt of solid-organ transplant and taking immunosuppressive therapy
- Receipt of chimeric antigen receptor (CAR)-T-cell or hematopoietic stem cell transplant (within 2 years of transplantation or taking immunosuppression therapy)
- Moderate or severe primary immunodeficiency (e.g., DiGeorge syndrome, Wiskott-Aldrich syndrome)
- Advanced or untreated HIV infection (people with HIV and CD4 cell counts <200/mm^3, history of an AIDS-defining illness without immune reconstitution, or clinical manifestations of symptomatic HIV)
- Active treatment with high-dose corticosteroids (i.e., ≥20 mg prednisone or equivalent per day when administered for ≥2 weeks), alkylating agents, antimetabolites, transplant-related immunosuppressive drugs, cancer chemotherapeutic agents classified as severely immunosuppressive, tumor-necrosis (TNF) blockers, and other biologic agents that are immunosuppressive or immunomodulatory (e.g., B-cell depleting agents)

Reality!

> 130,000 IC patients

across 46 UPMC sites

Anticipated 456 doses in 12/2021!

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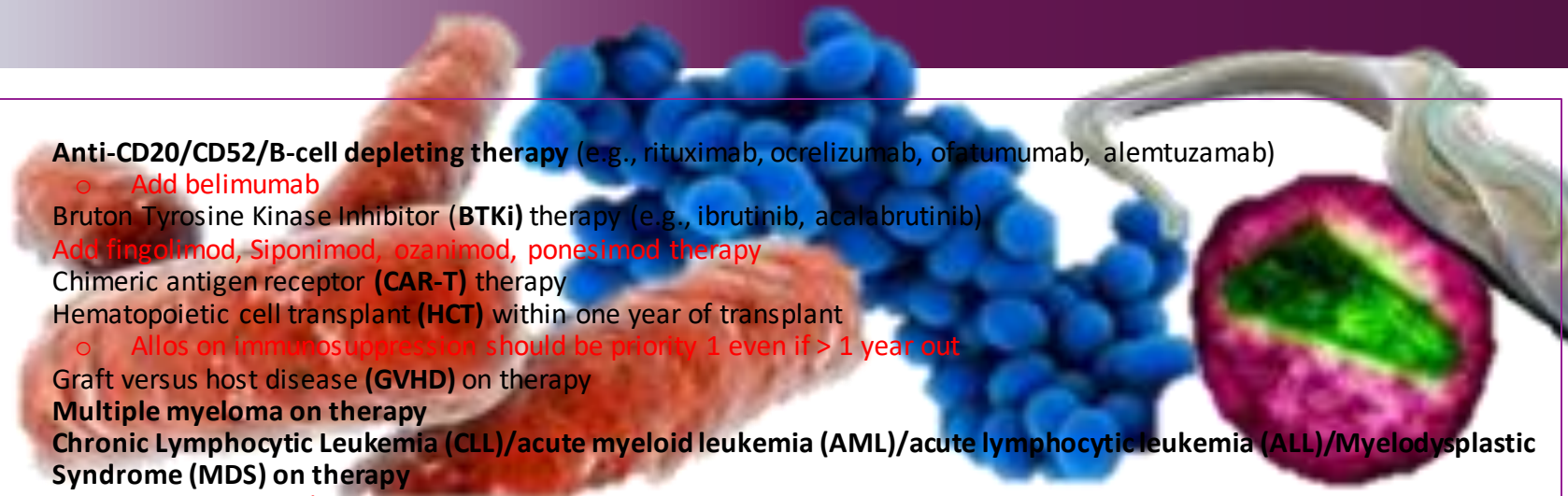
Tixagevimab Cilgavimab PrEP

- Ethical lottery
- Christmas 2021
- **Tier system** based on risk
- **Informed by COVICS data**
- NOT checking antibodies
  - **Logistics of mandating (already complex to give PrEP!)**
  - **How to interpret?**
    - **Just for "negative"?**
    - **Just for "low"? (how low?)**
    - **Serial testing?**
    - **What lab to use/trust?**
    - **$$$$**

Tier 1



- **Anti-CD20/CD52/B-cell depleting therapy** (e.g., rituximab, ocrelizumab, ofatumumab, alemtuzamab)
  - Add belimumab
- Bruton Tyrosine Kinase Inhibitor (**BTKi)** therapy (e.g., ibrutinib, acalabrutinib)
- Add fingolimod, Siponimod, ozanimod, ponesimod therapy
- Chimeric antigen receptor **(CAR-T)** therapy
- Hematopoietic cell transplant **(HCT)** within one year of transplant
  - Allos on immunosuppression should be priority 1 even if > 1 year out
- Graft versus host disease **(GVHD)** on therapy
- **Multiple myeloma on therapy**
- **Chronic Lymphocytic Leukemia (CLL)/acute myeloid leukemia (AML)/acute lymphocytic leukemia (ALL)/Myelodysplastic Syndrome (MDS) on therapy**
  - Move MDS and MPD to priority 2
- **Solid organ transplant AND within one year of transplant or rejection treatment with thymoglobulin or alemtuzumab**
- **Solid organ transplant AND aged 65 years or older**
- **Lung transplant recipient**
- **Severe primary immunodeficiency** (i.e., common variable immunodeficiency disease (CVID), agammaglobulinemia, chronic granulomatous disease (CGD), severe combined immunodeficiency (SCID), Wiskott-Aldrich, DiGeorge, Dock 8 or Stat 3 deficiency, hypogammaglobulinemia requiring intravenous immunoglobulin (IVIG) replacement)
- Acquired immunodeficiency syndrome **(AIDS)** with CD4 <200 or <15%

- "Living Tier"
- Modified base don clinician feedback (red)

- Rationale:
  - Highest risk to not "respond" to vaccines
  - **Most efficient: contact all and offer PrEP**

Erin McCreary
@ErinMcCreary

University of Pittsburgh

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Tier 1: highest risk

- 12/27/2021 – 2/1/2022
- **~ 17,000 Tier 1 patients contacted**
- ~ **1,110 patients treated** as of 2/25/2022

Erin McCreary
@ErinMcCreary

Tiers 2 and 3: lower risk

Tier 2

- **All other solid organ transplant patients**
- **All other stem cell transplant patients**
- **All other hematological malignancies**
  - Move CML to priority 3
  - Move AML patients not on treatment to priority 3
- **Aplastic anemia**
- **Age 65 years of age or older and two or more impairments of activities of daily living**

Tier 3

- **All solid tumor** on chemotherapy
- **All other immunosuppressive conditions** receiving immunotherapy
  - Consider moving RA patients on MMF/AZA and pred +/- MTX to priority 2 (total burden of IS drugs)
- Functional or anatomic **asplenia**
- Add sickle cell anemia
- All other primary/acquired immunodeficiency states

- "Living Tier"
- Modified base don clinician feedback (red)
- Delegating to patient's physician (Tix-cil orderable in EMR)

Erin McCreary
@ErinMcCreary

University of Pittsburgh

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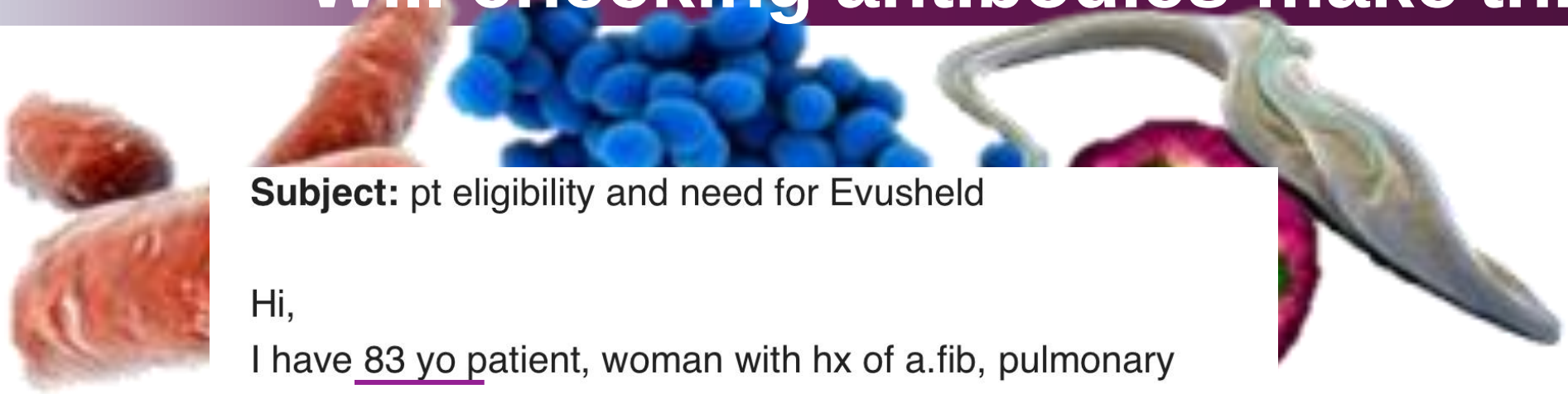
Will checking antibodies make things easier?



Subject: pt eligibility and need for Evusheld

Hi,

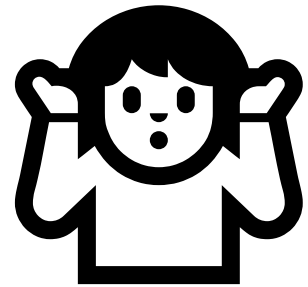
I have 83 yo patient, woman with hx of a.fib, pulmonary fibrosis 2/2 radiation, hx of lung cancer treated with chemo that was finished 2 months ago.

She also received 4th dose of Covid vaccine within a month or so.

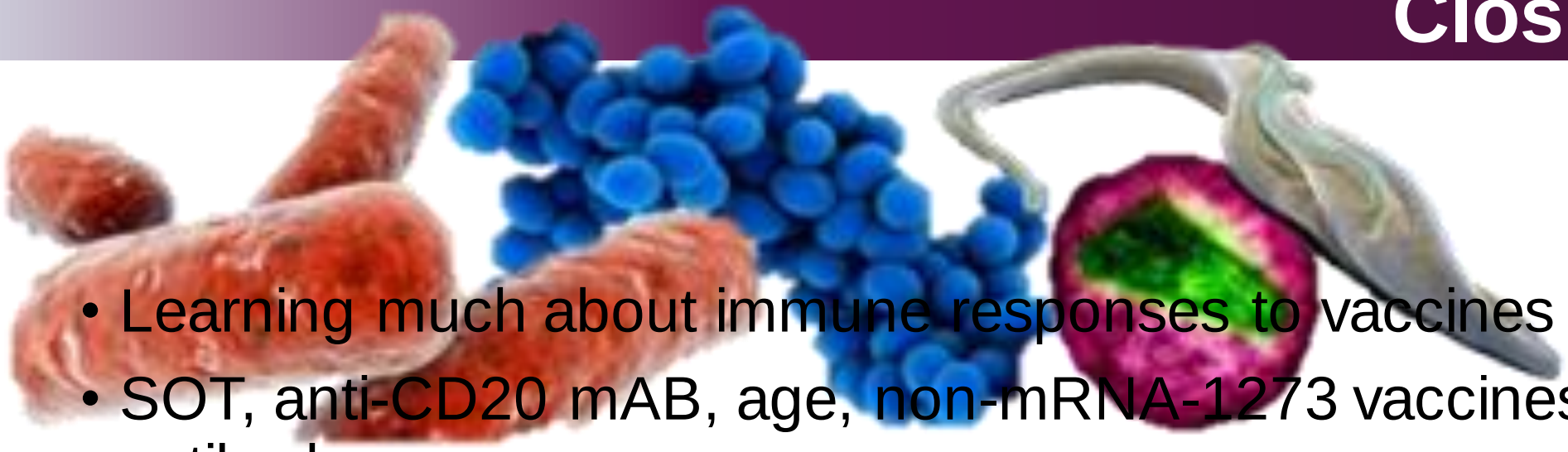
Does she need Evusheld?

Can she take it safely, considering cardiac hx?

My feeling is she does not need MAB if she got 4th vaccine



Closing remarks



- Learning much about immune responses to vaccines
- SOT, anti-CD20 mAB, age, non-mRNA-1273 vaccines: poorer antibody response
- Neutralization lower in IC vs HCW
- Clinical use still controversial
- “Precision medicine” approach in the future?

Acknowledgements

- **STUDY PARTICIPANTS**
- **UPMC/Wolff Center/Office of Healthcare innovation**
- Mounzer Agha MD
- Andrew Bilderback MS
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- Kelsey Linstrum Balish MS
- Rachel Troyan MBA
- Scott Rothenberger PhD
- Deborah K. McMahon MD
- Melissa D. Crandall MHA
- Michele D. Sobolewksi MS
- P. Nathan Enick BS
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Key Considerations & Future Directions in Serology Testing

Florian Krammer, PhD

Disclosures:

The Icahn School of Medicine at Mount Sinai has filed patent applications relating to SARS-CoV-2 serological assays (US provisional application numbers: 62/994,252, 63/018,457, 63/020,503 and 63/024,436) and NDV-based SARS-CoV-2 vaccines (US provisional application number: 63/251,020) which list F.K. as co-inventor. Patent applications were submitted by the Icahn School of Medicine at Mount Sinai. Mount Sinai has spun out a company, Kantaro, to market serological tests for SARS-CoV-2. F.K. has consulted for Merck and Pfizer (before 2020), and is currently consulting for Pfizer, Third Rock Ventures, Seqirus and Avimex. The F.K. laboratory is also collaborating with Pfizer on animal models of SARS-CoV-2.:

Key Considerations & Future Directions in Serology Testing

Florian Krammer

Mount Sinai Professor in Vaccinology

Icahn School of Medicine at Mount Sinai

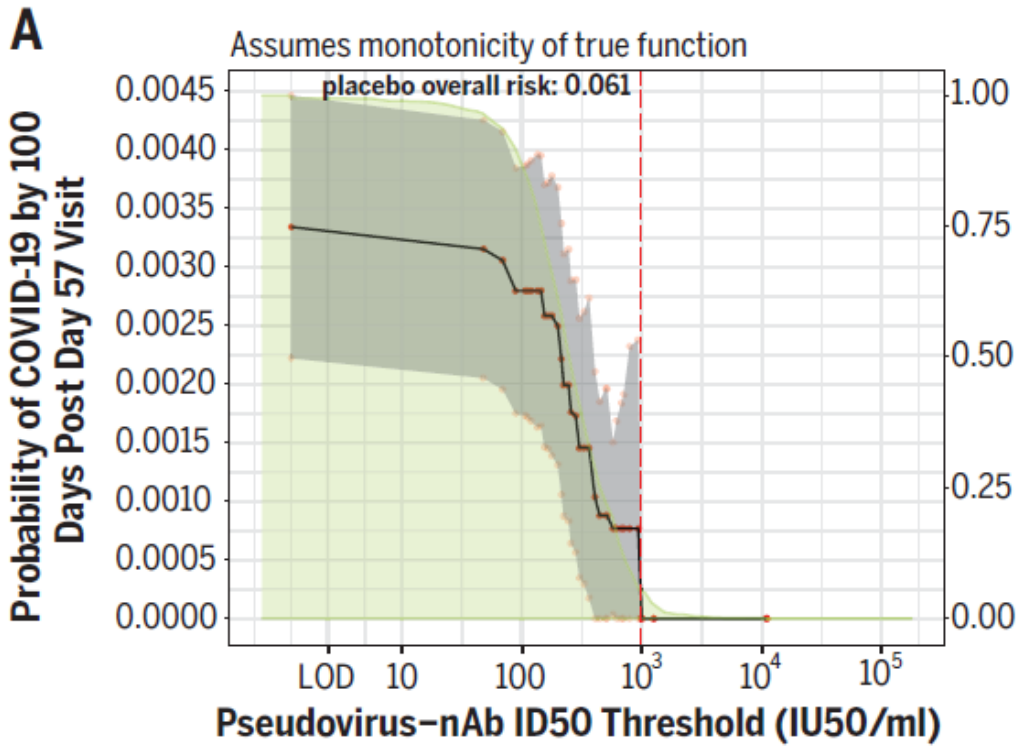
CDC/IDSA COVID-19 Clinician Call: Update on Serology Testing

February 26th, 2022

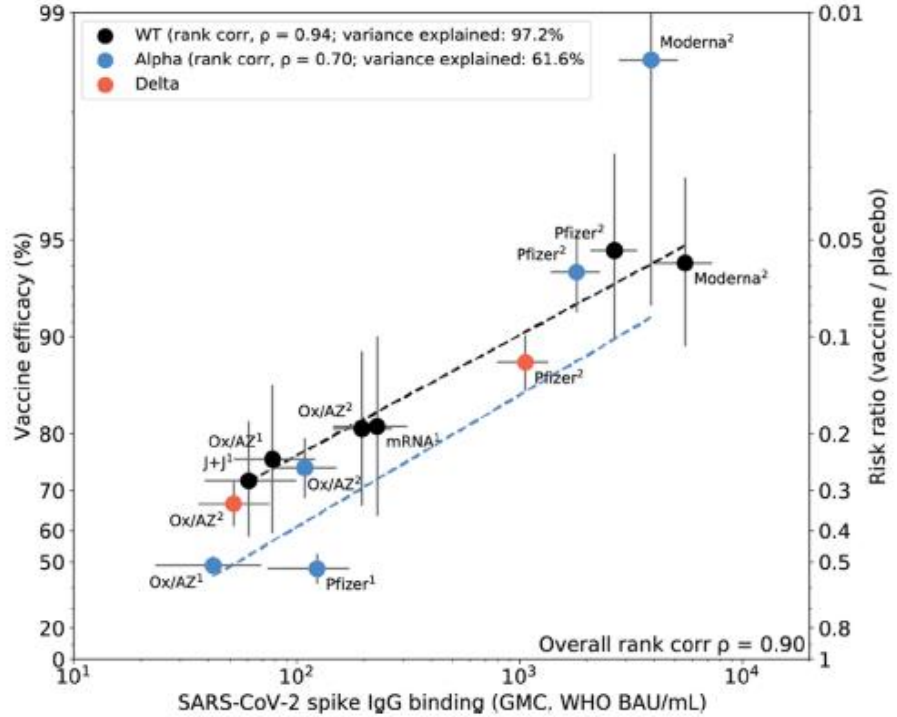
Mount Sinai

From a scientific perspective both neutralizing as well as spike binding antibodies correlate with protection from symptomatic disease

(mechanistically, it is likely mostly neutralizing antibody)



Gilbert *et al.*, Science, 2021



Goldblatt *et al.*, Vaccine, 2022

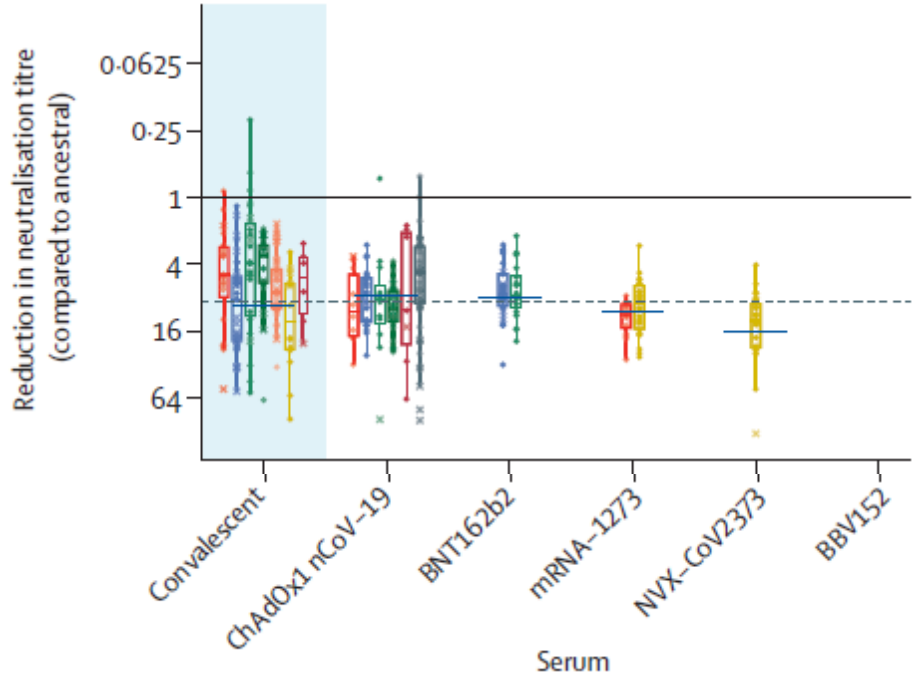
Use cases for a correlate of protection

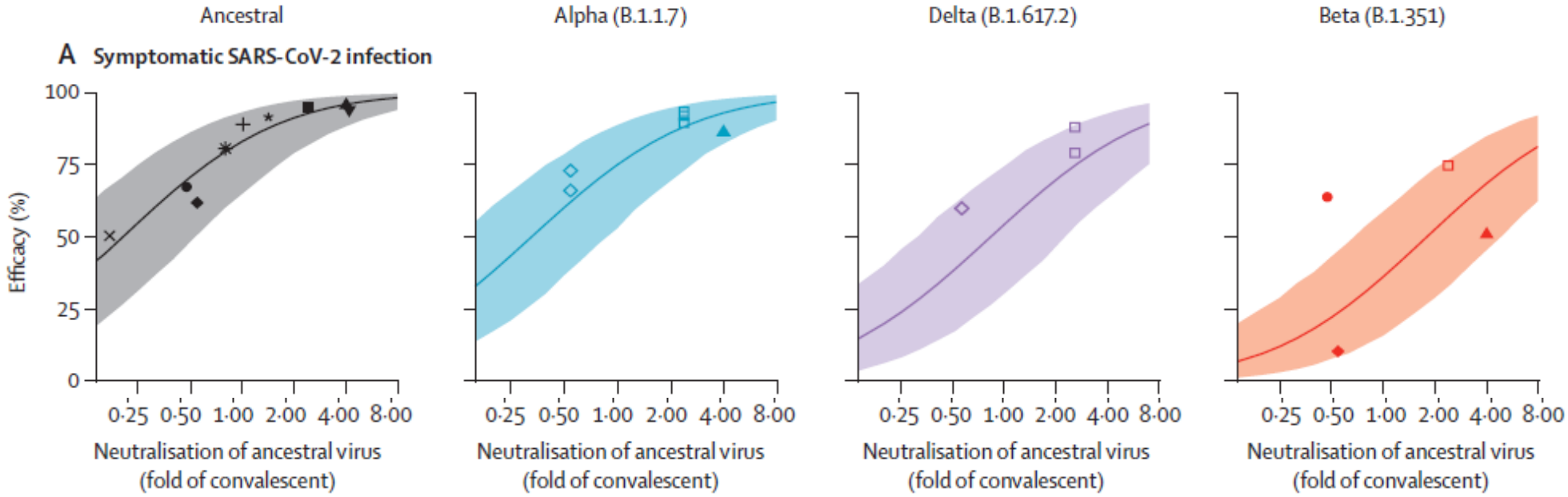
- Vaccine licensure can be facilitated by immuno-bridging
- Serology can be used to determine what percentage of the population is protected
- Serology can be used for patient management
  - Especially important for immunocompromised patients

Hurdles

- Targets of serological assays not unified
- Not all serological assay are quantitative
- Implementation of standards/international units is not widespread
- Variants make everything more complicated
- What endpoints are used? Protection from infection? From disease? From severe disease?

Variants make everything more complicated

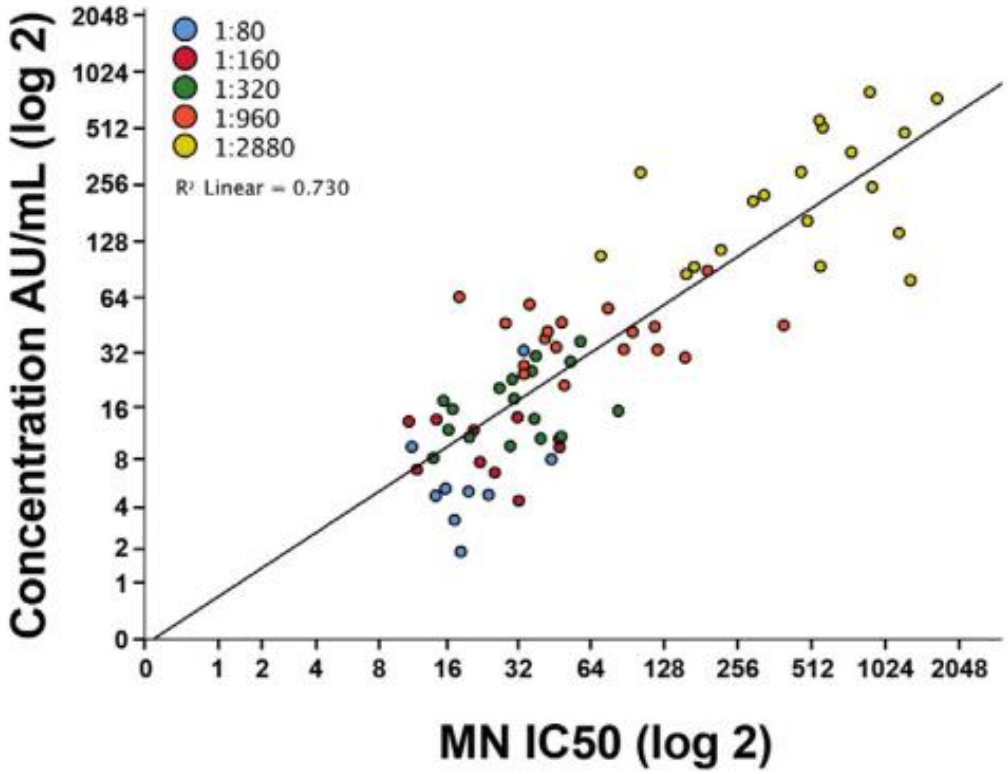




Cromer *et al.*, Lancet Microbe, 2022

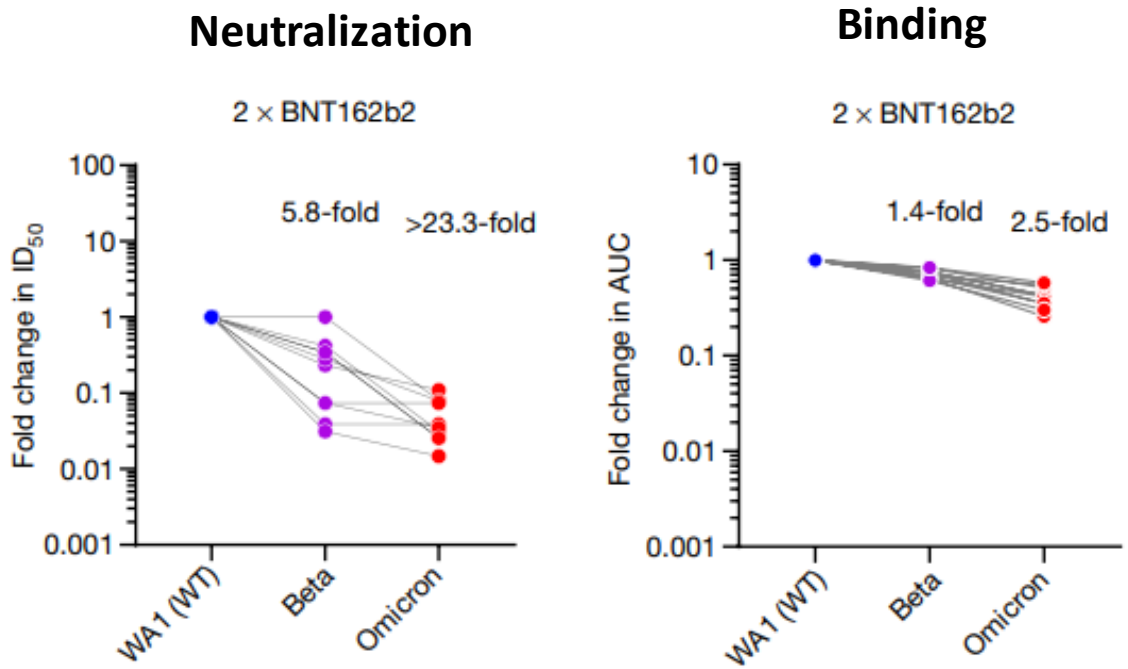
Variants make everything more complicated

Binding and neutralization titers to wild type SARS-CoV-2 correlate well



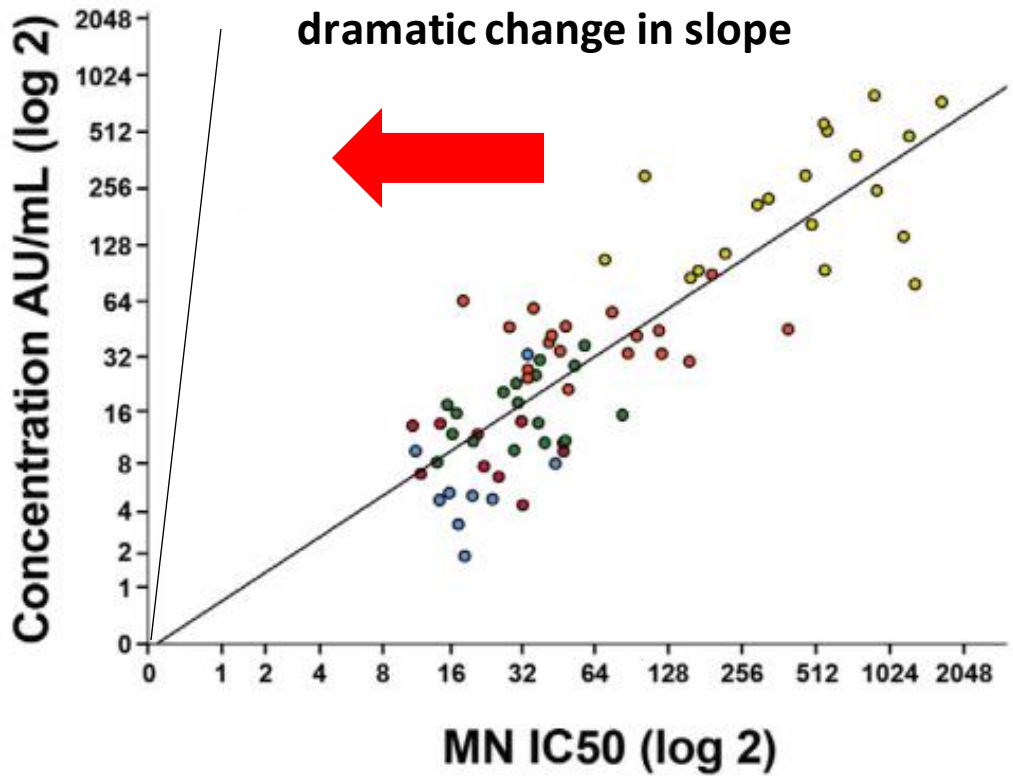
Zak *et al.*, Heliyon, 2021

Neutralizing titers against variants drop much more than binding titers



Carreño *et al.*, Nature, 2022

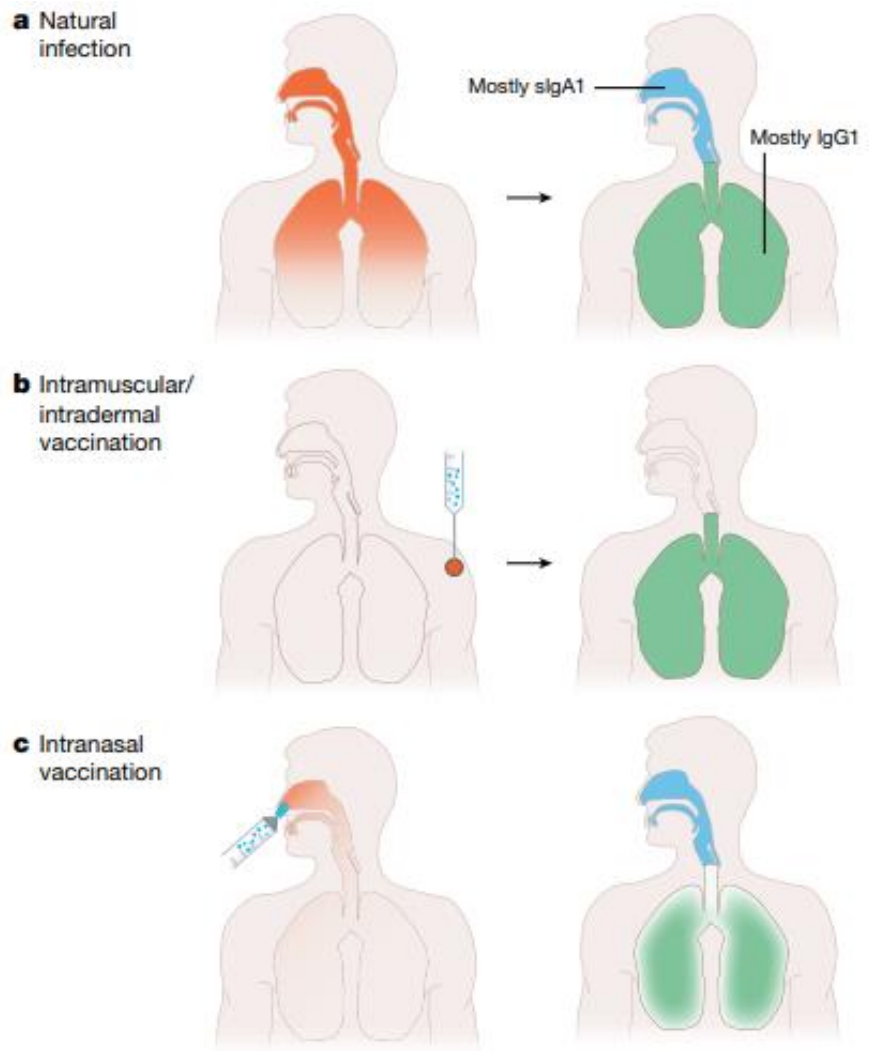
Variants make everything more complicated

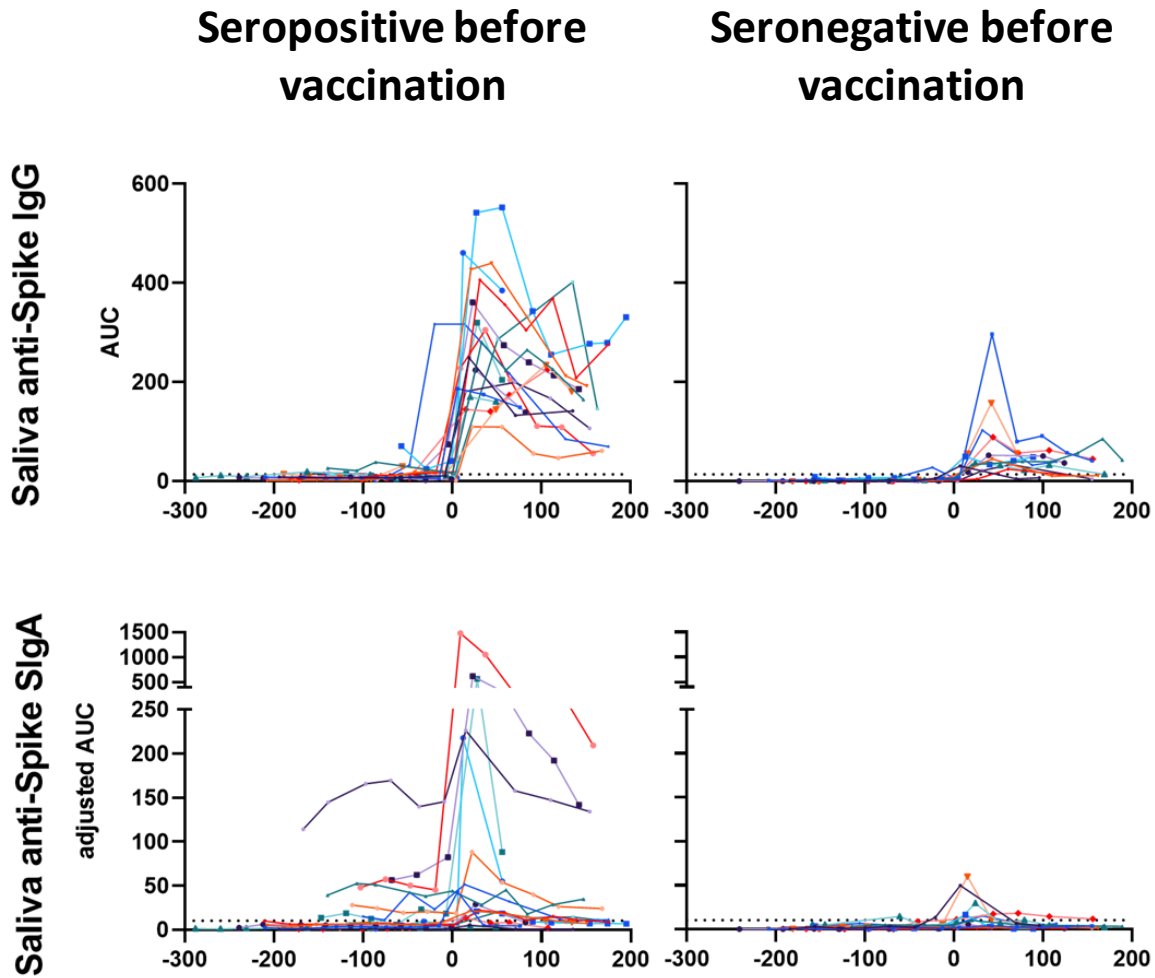


Protection from infection

- Mechanistically, this can really only be achieved by neutralizing antibodies
- Antibodies need to be present on mucosal surfaces of the upper and lower respiratory tract
- For SARS-CoV-2 vaccination this is IgG which ends up on mucosal surfaces
  - Good protection of the lower respiratory tract
  - Little in the URT, and levels may decline rapidly
- After natural infection locally produced sIgA may be the main mechanism of protection in the upper respiratory tract
- Virus dose and viral fusogenicity may be factors here as well

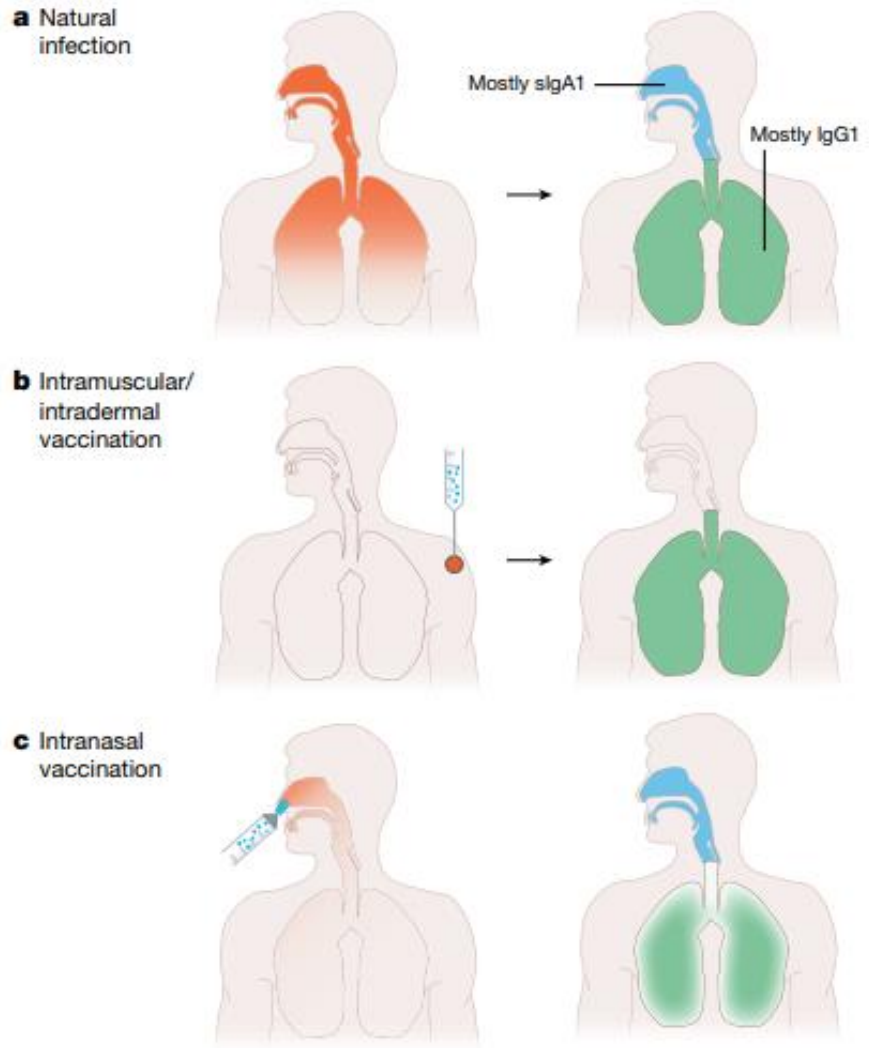
Mucosal antibodies matter!





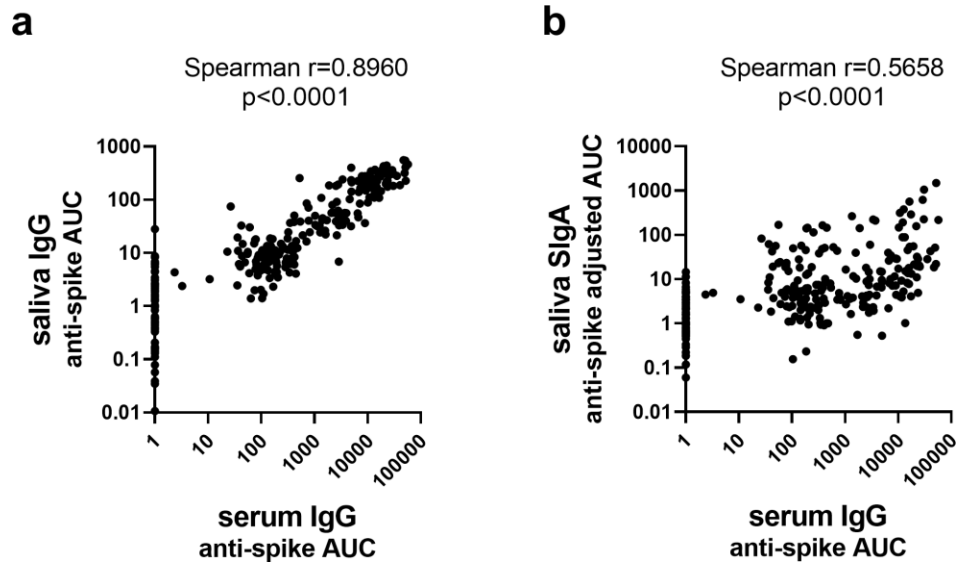
https://www.medrxiv.org/content/10.1101/2021.12.06.21267352v1

Mucosal antibodies matter!



Krammer, Nature, 2020

Mucosal IgG correlates with serum IgG, sIgA does not



https://www.medrxiv.org/content/10.1101/2021.12.06.21267352v1

Protection from disease

- The virus infects cells but replication is significantly reduced
- Potential contributing factors
  - Neutralizing antibodies at suboptimal levels
  - Non-neutralizing antibodies via effector functions
  - T-cells
  - Memory B cells which differentiate into plasmablasts and quickly increase (neutralizing) antibody levels
- The effect of T-cells and memory B cells likely depends strongly on incubation time – which is already very short for the recent Delta and Omicron variants

Protection from severe disease

- The virus infects cells, spreads, causes symptoms but replication is significantly slowed/attenuated, especially in the lower respiratory tract
- Potential contributing factors:
  - Neutralizing antibodies at suboptimal levels, but high enough IgG titers to protect the lower respiratory tract
  - Non-neutralizing antibodies via effector functions
  - T-cells
  - Memory B cells which differentiate into plasmablasts and quickly increase (neutralizing) antibody levels
- T-cells and memory B cells have significantly more time to respond since disease progression takes time

Conclusions

- Serum neutralizing antibodies are expected to correlate well with protection from infection and disease
- Protection from severe disease is much more complicated
- Variants increase complexity
- Standardization is still not available
- Nevertheless, serology is a great tool to
  - Aid in vaccine licensure through immuno-bridging studies
  - Help manage immunocompromised patients
  - Try to determine infection/vaccination histories

Q&A

Selected Resources

Dr. Karsner

FDA Resources

- https://www.fda.gov/medical-devices/coronavirus-disease-2019-covid-19-emergency-use-authorizations-medical-devices/in-vitro-diagnostics-euas
- https://www.fda.gov/medical-devices/emergency-use-authorizations-medical-devices/coronavirus-disease-2019-covid-19-emergency-use-authorizations-medical-devices
- https://www.fda.gov/medical-devices/coronavirus-covid-19-and-medical-devices/faqs-testing-sars-cov-2

Dr. Krammer

- https://www.medrxiv.org/content/

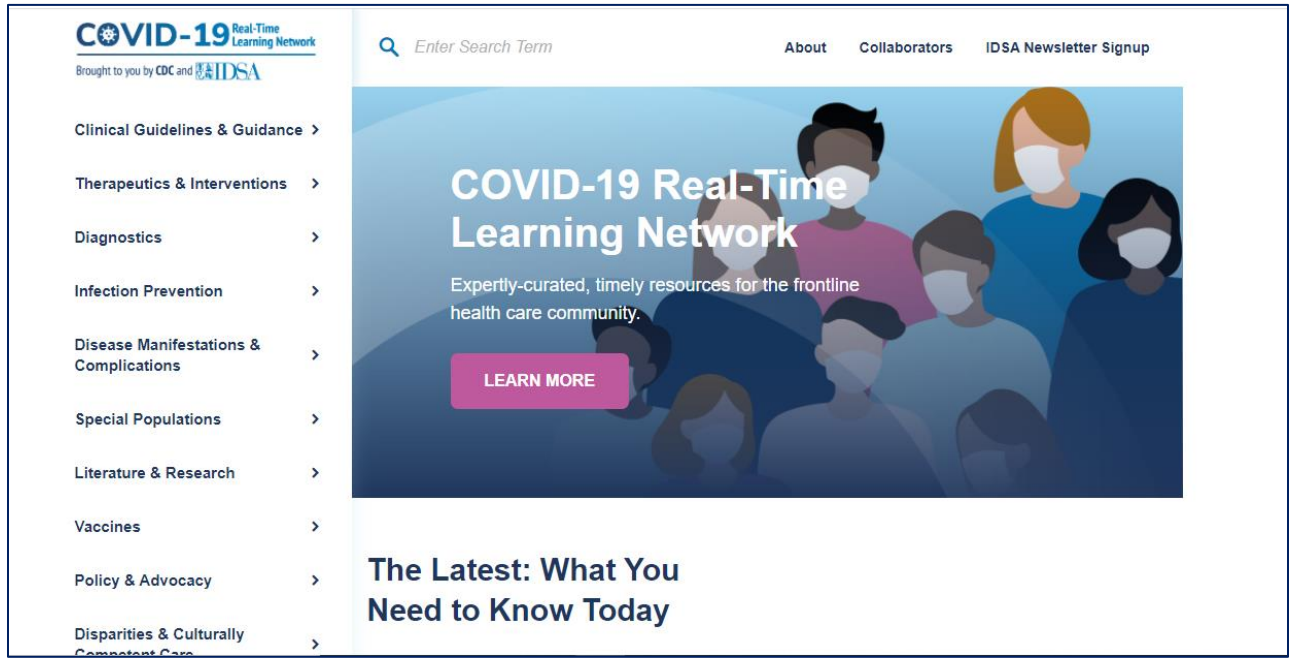
Program Links:

- This webinar is being recorded and can be found with the slides online at https://www.idsociety.org/cliniciancalls
- COVID-19 Real-Time Learning Network: https://www.idsociety.org/covid-19-real-time-learning-network/
- Vaccine FAQ: https://www.idsociety.org/covid-19-real-time-learning-network/vaccines/vaccines-information--faq/

COVID-19 Real-Time Learning Network

Brought to you by CDC and IDSA

An online community bringing together information and opportunities for discussion on latest research, guidelines, tools and resources from a variety of medical subspecialties around the world.



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American College of Physicians
American Geriatrics Society
American Thoracic Society
Pediatric Infectious Diseases Society
Society for Critical Care Medicine
Society for Healthcare Epidemiology of America
Society of Hospital Medicine
Society of Infectious Diseases Pharmacists

www.COVID19LearningNetwork.org
@RealTimeCOVID19
#RealTimeCOVID19

CDC-IDSA Partnership: Clinical Management Call Support

FOR WHOM?

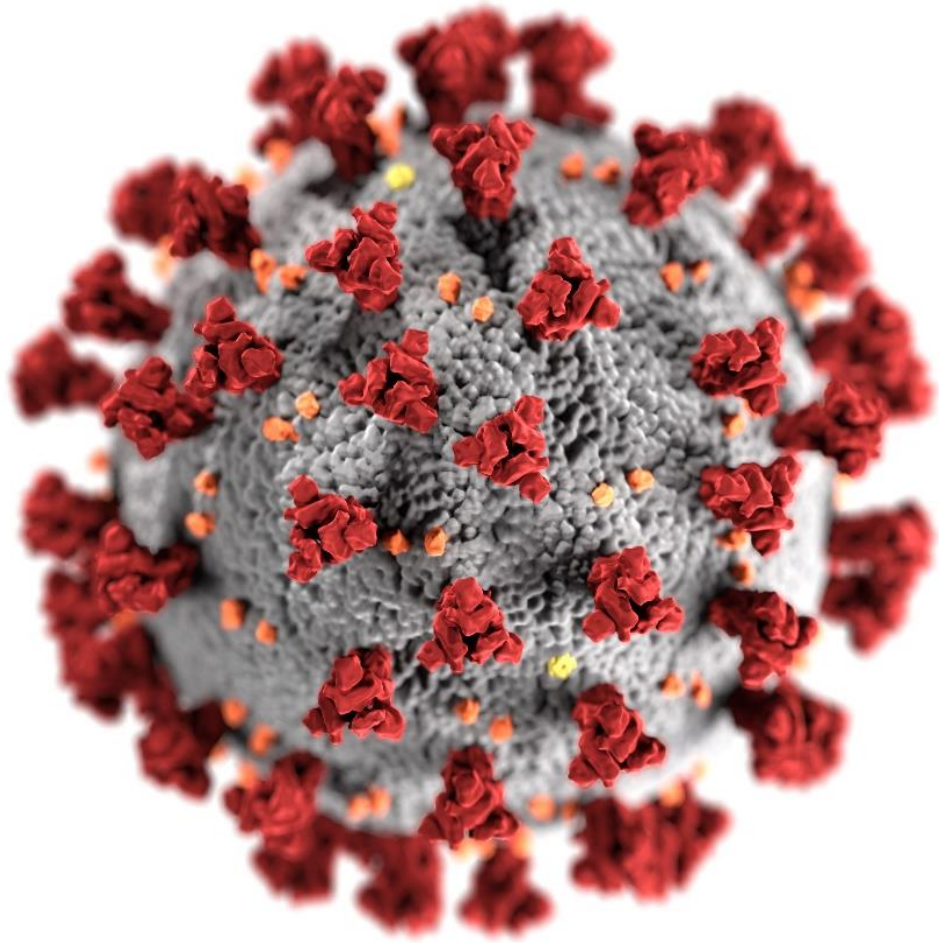
- Clinicians who have questions about the clinical management of COVID-19

WHAT?

- Calls from clinicians will be triaged by CDC to a group of IDSA volunteer clinicians for peer-to-peer support

HOW?

- Clinicians may call the main CDC information line at 800-CDC-INFO (800-232-4636)
- To submit your question in writing, go to www.cdc.gov/cdc-info and click on Contact Form



IDSA
Infectious Diseases Society of America

cdc.gov/coronavirus

Continue the conversation on Twitter

@RealTimeCOVID19
#RealTimeCOVID19

We want to hear from you!

Please complete the post-call survey.

Next Call

Saturday, March 12th

A recording of this call, slides and the answered Q&A will be posted at **www.idsociety.org/cliniciancalls**

-- library of all past calls now available --

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