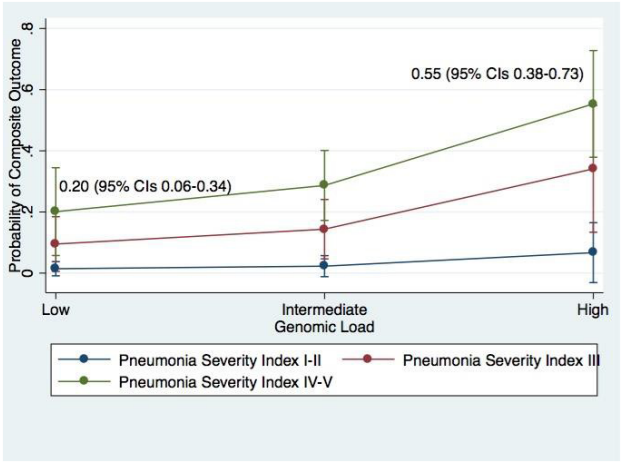
Prediction of Outcomes Based on Genomic Load and Pneumonia Severity Index



Conclusion: High genomic load of SARS-CoV-2 in nasopharyngeal samples at the time of admission is independently associated with mortality and intubation. This finding should prompt further research on the role of viral load as a clinical predictor and possible modifiable risk factor for adverse outcomes as treatment strategies evolve in this global pandemic.

Disclosures: **All Authors**: No reported disclosures

414. Association of SARS-CoV-2 Genomic Load Trends with Clinical Status in COVID-19:A Retrospective Analysis from an Academic Hospital Center in New York City

Ioannis Zacharioudakis, MD[1]; Fainareti Zervou, MD[2]; Prithiv Prasad, MBBS[2]; Yongzhao Shao, PhD[2]; Atreyee Basu, MD[2]; Kenneth Inglima[3]; Scott Weisenberg, MD[2]; Maria E. Aguero-Rosenfeld, MD[1]; [1]New York University, Long Island City, New York; [2]NYU, New York, New York; [3]NYU Langone Health, New York, NY

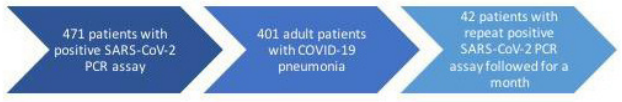
Session: P-13. COVID-19 Diagnostics

Background: The Infectious Diseases Society of America has identified the potential use of SARS-CoV-2 genomic load for prognostication purposes as a key research question.

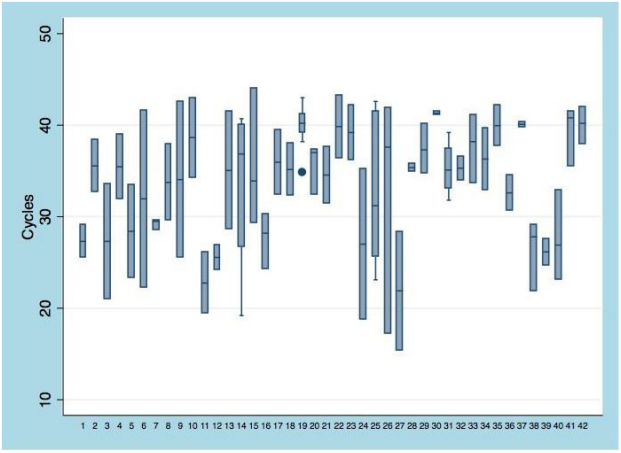
Methods: We designed a retrospective cohort study that included adult patients with COVID-19 pneumonia who had at least 2 positive nasopharyngeal tests at least 24 hours apart to study the correlation between the change in the genomic load of SARS-CoV-2 in nasopharyngeal samples, as reflected by the Cycle threshold (Ct) value of the real-time Polymerase Chain Reaction (PCR) assay, with change in clinical status. The Sequential Organ Failure Assessment (SOFA) score was used as a surrogate for patients' clinical status. A linear mixed-effects regression analysis was performed.

Results: Among 457 patients who presented to the emergency department between 3/31/2020- 4/10/2020, we identified 42 patients who met the inclusion criteria. The median initial SOFA score was 2 (IQR 2–3). 20 out of 42 patients had a lower SOFA score on their subsequent tests. We identified a statistically significant inverse correlation between the change in SOFA score and change in the Ct value with a decrease in SOFA score by 0.05 (SE 0.02; $p < 0.05$) for an increase in Ct values by 1. This correlation was independent of the duration of symptoms.

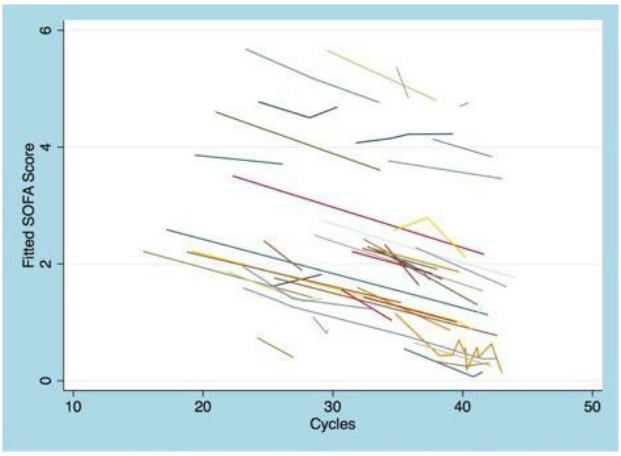
Flow chart



A graph of the Cycle Threshold (Ct) values of the of Cepheid Xpert® Xpress SARS-CoV-2 assay measured on repeat screening of the 42 included patients.



Graph of the fitted SOFA scores based on the Cycle Threshold values per patient.



Conclusion: Our findings suggest that an increasing Ct value in sequential tests may be of prognostic value for patients diagnosed with COVID-19 pneumonia. Before repeat testing can be recommended routinely in clinical practice as a predictor of disease outcomes, prospective studies with a standardized interval between repeat tests should confirm our findings.

Disclosures: **All Authors**: No reported disclosures

415. Clinical Impact of Molecular Point-of-Care Testing for COVID-19 in Adults Presenting to Hospital: A Prospective, Interventional, Non-Randomised, Controlled Study

Nathan J. Brendish, PhD[1]; Stephen Poole, BMBS[1]; Vasanth V. Naidu, MBBS[1]; Christopher Mansbridge, MBBS[1]; Nicholas Norton, PhD[1]; Helen Wheeler, n/a[2]; Laura Presland, n/a[3]; Sean Ewings, PhD[4]; Stephen P. Kidd, MSc[5]; Nick Cortes, MBBS[5]; Tristan William. Clark, BM MRCP DTM&H MD[4]; [1]University Hospitals Southampton NHS Trust, Southampton, England, United Kingdom; [2]NIHR Southampton Biomedical Research Centre, University Hospital Southampton NHS Foundation Trust, Southampton, UK, Southampton, England, United Kingdom; [3]NIHR Southampton Biomedical Research Centre, Southampton, England, United Kingdom; [4]University of Southampton, Southampton, England, United Kingdom; [5]Hampshire Hospitals Foundation NHS Trust, Basingstoke, England, United Kingdom

Session: P-13. COVID-19 Diagnostics

Background: The management of the COVID-19 pandemic is hampered by the long delays associated with laboratory PCR testing. In hospitals this leads to poor patient flow and nosocomial transmission and so rapid, accurate diagnostic tests are urgently required. The aim of this study was to evaluate the clinical impact and real-world diagnostic accuracy of molecular point-of-care testing (mPOCT) for COVID-19 in hospital.

Methods: We performed a prospective, interventional, non-randomised, controlled study of mPOCT for COVID-19 in adults presenting to hospital with suspected COVID-19. Patients were tested using the QIAstat-Dx SARS-CoV-2 at the point-of-care with results delivered to clinical and infection control teams. Control patients were tested using the PHE Rdrp reference assay. The Primary outcome measure was time to result and secondary outcome measures included infection control outcomes and measures of diagnostic accuracy.

Results: Between 20th March and 29th April 2020 500 patients were tested by POCT and 555 controls, who were tested with laboratory PCR, were identified. Overall 33% were positive for SARS-CoV-2. Median time to results with POCT was 1.7 (1.6 to 1.9) hours versus 21.3 (16.0 to 27.9) hours in the control group (difference of 19.6 hours, 95%CI 19.0 to 20.3; p< 0.0001). Median time to arrival in definitive clinical area (COVID-19 positive or negative ward) was 8.0 (6.0 to 15.0) hours in the POCT group versus 28.8 (23.5 to 38.9) hours in the control group, p< 0.0001. Median time to enrolment into other COVID-19 clinical trials was 1.5 (1 to 3) days in the POCT versus 3.0 (2 to 5) days in the control group, p< 0.0001. Sensitivity of the POCT was 99.4% and specificity was 98.3%. The sensitivity of the laboratory PHE reference RdRp assay was 87.2% and specificity was 98.9%.

Conclusion: mPOCT was associated with a large reduction in time to results and improvements in infection control measures and patient flow, compared with laboratory PCR. In addition, patients were recruited onto other clinical trials more rapidly with POCT. The QIAstat-Dx SARS-CoV-2 panel had high diagnostic accuracy for the detection of COVID-19 compared to laboratory PCR. Resources should be urgently made available to support the widespread implementation of mPOCT in hospitals, in preparation for the second wave.

Disclosures: **Tristan William. Clark, BM MRCP DTM&H MD**, **BioFire Diagnostics** (Other Financial or Material Support, Equiptment and consumables for the purposes of research)**BioMerieux** (Other Financial or Material Support, Equipment and consumables for the purposes of research)**Qiagen** (Other Financial or Material Support, Discounted Equipment and consumables for the purposes of research)

416. Comparative Analytical Assessment of PCR Mastermixes for Detection of SARS-CoV-2 using the CDC Diagnostic Test and the LightMix Modular Test on the cobas® z 480 Analyzer

Steven Cagas, PhD[1]; Stephen McCune, BS[1]; Pedro Rodriguez, Ph.D[2]; Ray Hein, PhD[1]; John Osiecki, PhD[1]; Nicole Robinson, Ph.D[2]; Chris L. McGowin, PhD[1]; [1]Roche Diagnostics Corp, Indianapolis, Indiana; [2]Roche Diagnostics Corporation, Indianapolis, CA

Session: P-13. COVID-19 Diagnostics

Background: The novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is a betacoronavirus responsible for the ongoing global pandemic and associated respiratory disease. Rapid development and implementation of molecular diagnostic testing solutions has been imperative to meet the enormous and urgent public health needs, and remains a key component of the US emergency response. Nucleic acid amplification tests (NAATs), with emergency use authorization (EUA) by the FDA, have been subject to significant supply chain shortages. This study aims to comparatively assess several commercially available substitutive mastermix reagents for the CDC SARS-CoV-2 EUA test and the TIB Mol Biol LightMix Modular (RUO) test.

Methods: Positive control material included with each testing kit was used directly as DNA template for all manually assembled reactions and comparative evaluation. Additionally, these tests were evaluated similarly using the cobas omni Optimization kit, the first step in assessing suitability on the cobas® omni Utility Channel for high-volume user-defined molecular testing on the fully automated cobas® 6800/8800 Systems. All PCR was performed per the manufacturer's instructions using the User Defined Workflow (UDF; open channel) on the cobas® z 480 analyzer.

Results: Robust amplification of the commercial control material was observed with each mastermix for all gene targets within the CDC and LightMix tests. Modest but significant (ANOVA, p< 0.05) target-specific Ct-value impacts were observed among the mastermixes assessed in this study. Using the cobas® omni optimization kit, Ct values for each target within the CDC and LightMix tests were consistently and significantly lower (ANOVA, p< 0.05) than the comparator mastermixes.

Conclusion: Each mastermix may be a useful alternative to the recommended mastermix for SARS-CoV-2 detection. Additionally, these findings suggest the CDC and LightMix tests may be adapted for fully-automated, high-throughput testing on the 6800/8800 Systems.

Disclosures: Steven Cagas, PhD, Roche Diagnostics Corp (Employee) Stephen McCune, BS, Roche Diagnostics Corp (Employee) Pedro Rodriguez, Ph.D, Roche Diagnostics Corp (Employee) Ray Hein, PhD, Roche Diagnostics Corp (Employee) John Osiecki, PhD, Roche Diagnostics Corp (Employee) Nicole Robinson, Ph.D, Roche Diagnostics Corp (Employee) Chris L. McGowin, PhD, Roche Diagnostics Corp (Employee)

417. Comparative Assessment of Multiple SARS-CoV-2 Antibody and Neutralization Assays from Blood Samples in COVID-19 Infected Patients.

Robin L. Dewar, PhD[1]; Christina Trevino, MT/CLS[2]; Perrine Lallemand, BSc[3]; Helene Highbarger, MSc.[3]; Tarek A. Elbeik, PhD[2]; Tauseef Rehman, MSc[3]; Michael Holbrook, PhD[4]; Connie Schmaljohn, PhD[4]; Cliff Lane, MD[4]; Aarthi Chary, MD[5]; Mark Holodniy, MD, CIC[6]; [1]Frederick National Laboratory, Frederick, MD; [2]Veterans Affairs, Palo Alto, California; [3]Leidos Biomedical Research, Inc., Frederick, Maryland; [4]NIAID, Frederick, Maryland; [5]VA Palo Alto Health Care System, Palo Alto, CA; [6]Department of Veterans Affairs, Palo Alto, CA

Session: P-13. COVID-19 Diagnostics

Background: The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2, COVID-19) has caused a world-wide pandemic. Diagnosis is usually made by an RT-PCR test from a respiratory sample. A number of tests are available for antibody detection or assessment, including rapid, enzyme immunoassays (EIA) and neutralization. However, characterization of the antibody immune response is not well documented and the clinical significance of COVID antibodies remains largely unknown. In addition, comparison of results across different assay formats using identical samples has not been rigorously studied, making clinical interpretation of serologic tests difficult.

Assessment of multiple SARS-CoV-2 antibody and neutralization assays from blood samples in COVID-19 infected patients

Patient Information		Rapid Test	Rapid Test	Rapid Test	ELISA	ELISA	ELISA	Test name				Binding Inhibition Plate Assay
		Chembio DPP® COVID-19 IgM/IgG System	SD BIOSENSOR STANDARD™ Q COVID-19 IgM/IgG Duo Test	BTNX Rapid Response™ COVID-19 IgG/IgM Test Cassette	BIORAD Platelia SARS-CoV-2 Total Ab	EUROIMMUN Anti-SARS-CoV-2 ELISA (IgG)	EUROIMMUN Anti-SARS-CoV-2 ELISA (IgA)					GenScript SARS-CoV-2 Surrogate Virus Neutralization Test
		Nucleocapsid Protein (NP) antigen	SARS-CoV-2 recombinant protein	SARS-CoV-2 antigens	SARS-CoV-2 nucleocapsid antibodies (IgM/IgA/Ab	Recombinant structural protein of SARS-CoV-2	Recombinant structural protein of SARS-CoV-2	Test Target (from package insert or communication from				Recombinant antigen to S protein targets
		Interpretation	Interpretation	Interpretation	Interpretation	Interpretation	Interpretation					Interpretation
Patient Number	Days Ab Testing after first recorded RT-PCR+	Chembio	SD Biosensor	BTNX	Biorad: IgM, IgG, IgA	Euroimmun IgG	Euroimmun IgA	IgG/IgM Assays Tested	IgG and/or IgM Agreement	Total Assays Tested	Total Agreement	GenScript Binding Inhibition ACE2 receptors
		No EUA	No EUA	No EUA	EUA	EUA	No EUA					No EUA
1	4	Negative	Positive		Positive	Negative	Negative	4	50%	5	60%	Positive
1	8	Positive	Positive	Positive*	Positive	Positive	Negative	5	100%	6	83%	Positive
1	14	Positive	Positive		Positive	Positive	Negative	4	100%	5	80%	Positive
1	18	Positive	Positive		Positive	Positive	Negative	4	100%	5	80%	Positive
1	26	Positive	Positive		Positive	Positive	Negative	4	100%	5	80%	Positive
1	42	Positive	Positive	Positive*	Positive	Positive	Negative	5	100%	6	83%	Positive
2	8	Negative	Negative		Equivocal	Negative	Negative	4	75%	5	66%	Negative
2	20	Positive	Positive	Positive	Positive	Positive	Positive	5	100%	6	100%	Positive
2	48	Positive	Positive	Positive	Positive	Positive	Positive	5	100%	6	100%	Positive
3	-3	Negative	Negative	Negative	Negative	Negative	Negative	5	100%	6	100%	Negative
3	2	Negative	Negative	Negative	Negative	Negative	Negative	5	100%	6	100%	Negative
4	18	Positive	Positive		Positive	Positive	Positive	4	100%	5	100%	Positive
4	29	Positive	Positive	Positive	Positive	Positive	Positive	5	100%	6	100%	Positive
4	46	Positive	Positive	Positive	Positive	Positive	Positive	5	100%	6	100%	Positive
5	2	Positive	Negative	Negative	Negative	Negative	Positive	5	80%	6	66%	Negative
5	7	Negative	Negative	Negative	Equivocal	Negative	Positive	5	80%	6	66%	Negative
6	0	Negative	Negative	Negative	Negative	Negative	Negative	5	100%	6	100%	Negative
6	13	Negative	Negative		Equivocal	Negative	Negative	4	75%	5	80%	Negative
6	28	Positive*	Positive		Positive	Positive	Negative	4	100%	5	80%	Positive
7	0	Negative	Negative	Negative	Negative	Negative	Negative	5	100%	6	100%	Negative
7	5	Positive	Positive	Positive	Positive	Positive	Positive	5	100%	6	100%	Positive
7	5	Positive	Positive		Positive	Positive	Positive	4	100%	5	100%	Positive
8	4	Positive	Positive	Positive	Positive	Positive	Positive	5	100%	6	100%	Positive
8	15	Positive	Positive	Positive	Positive	Positive	Positive	5	100%	6	100%	Positive
9	0	Negative	Negative	Negative	Negative	Negative	Negative	5	100%	6	100%	Negative
9	6	Positive	Positive		Positive	Positive	Positive	4	100%	5	100%	Positive
10	0	Negative	Negative		Negative	Negative	Negative	4	100%	5	100%	Positive
10	4	Negative	Negative		Negative	Negative	Negative	4	100%	5	100%	Positive
11	23	Positive	Positive		Positive	Positive	Positive	4	100%	5	100%	Positive
11	31	Positive	Positive		Positive	Positive	Positive	4	100%	5	100%	Positive
13	6	Positive	Positive		Positive	Positive	Positive	4	100%	5	100%	Positive
13	7	Positive	Positive		Positive	Positive	Positive	4	100%	5	100%	Positive
14	5	Positive	Positive		Positive	Positive	Positive	4	100%	5	100%	Positive
mean	13.5							4.5	96%	5.5	91%	

Methods: 1–5 serial (total 33) serum or plasma samples from 14 patients who were positive for SARS-CoV-2 by EUA authorized RT-PCR assays from nasopharyngeal specimens where tested with the following COVID-19 antibody tests: LFA rapid tests (Chembio DPP IgM/IgG, SD Biosensor Standard IgM/IgG, BTNX Rapid Response IgM/IgG), and EIA tests (BioRad Platelia SARS-CoV-2 Total antibody-IgG/IgM/IgA, EuroImmun SARS-CoV-2 IgG, and EuroImmun SARS-CoV-2 IgA). See Table 1 for results and EUA. Results were recorded as positive, negative, or equivocal. Additionally, antibody neutralization was assessed on matched samples.

Results: Mean age of SARS-CoV-2 positive patients was 73 years (range 65–89), 11/14 had symptoms, all were male and hospitalized (6 ICU), and 3 died. Average number of days serum was collected after RT-PCR positivity was 13.5 days (range -3 to 46 d). BTNX assay was only tested on 16 samples. Among all assays, total concordance of results was 91%. When only IgG/IgM or total antibody assays were considered, concordance of results was 96% (Table). IgA specific results were discordant in 9/33 (27%) of samples compared to other assays. Two patients were negative in all assays in serial samples collected within one week of PCR positivity. Antibody neutralization was detected, but not from all samples.

Conclusion: In general, there was good agreement among antibody detection assays. Neutralization may reflect disease outcome. The study was limited by the number of positive samples and patient number, and at the time specificity was not addressed for all the assays.

Disclosures: **All Authors**: No reported disclosures

418. Comparison of the Abbott SARS-CoV-2 IgG and DiaSorin LIASON SARS-CoV-2 S1/S2 IgG Antibody Assays

Grace A. Schaack, BS[1]; Derrick Chen, MD[1]; [1]University of Wisconsin School of Medicine and Public Health, Madison, Wisconsin

Session: P-13. COVID-19 Diagnostics

Background: The Abbott Laboratories SARS-CoV-2 IgG assay and the DiaSorin LIASON SARS-CoV-2 S1/S2 IgG assay are both chemiluminescent immunoassays that