SARS-CoV-2 Testing FAQ

Are swabs from anterior nares, middle turbinate, posterior nasopharynx, and posterior pharynx equivalent as swab testing locations for detecting SARS-CoV-2?

- Results: 35 patients were diagnosed with SARS-CoV-2 by means of either NP or OP/N sampling. The paired swabs were both positive in 31 patients. The one patient who tested negative on both NP and OP/N swab on admission, was ultimately diagnosed on bronchoalveolar lavage fluid. A strong correlation was found between the viral RNA loads of the paired swabs ($r = 0.76$; $P < 0.05$). The sensitivity of NP and OP/N analysis in hospitalized patients ($n = 28$) was 89.3% and 92.7% respectively. Conclusions: This study demonstrates equivalence of NP and OP/N sampling for detection of SARS-CoV-2 by means of rRT-PCR. Sensitivity of both NP and OP/N sampling is very high in hospitalized patients.
- Combined oropharyngeal/nasal swab is equivalent to nasopharyngeal sampling for SARS-CoV-2 diagnostic PCR. Tania Desmet, Peter De Paepe, Jerina Boelens, et al. medRxiv 2020.06.05.20123745; doi:https://doi.org/10.1101/2020.06.05.20123745
- Given the global shortage of nasopharyngeal (NP) swabs typically used for respiratory virus detection, alternative collection methods were evaluated during the COVID-19 pandemic. This study showed that a combined oropharyngeal/nares swab is a suitable alternative to NP swabs for the detection of SARS-CoV-2, with sensitivities of 91.7% and 94.4%, respectively.
- LeBlanc JJ, Heinstein C, MacDonald J, Pettipas J, Hatchette TF, Patriquin G. A combined oropharyngeal/nares swab is a suitable alternative to nasopharyngeal swabs for the detection of SARS-CoV-2. J Clin Virol. 2020;128:104442. doi:10.1016/j.jcv.2020.104442

Are self-collected swabs from anterior nares or middle turbinate equivalent to medical-personnel-collected swabs for detecting SARS-CoV-2?

- Home mid-nasal swab collection was fairly comparable to clinician-collected nasopharyngeal swab collection for detection of SARS-CoV-2 symptomatic patients, particularly those with higher viral loads.
- McCulloch DJ, Kim AE, Wilcox NC, et al :Comparison of Unsupervised Home Self-Collected Mid-nasal Swabs With Clinician-Collected Nasopharyngeal Swabs for Detection of SARS-CoV-2 Infection. JAMA Netw Open 2020;3:e2016382.
- The diagnostic sensitivity of the self-collected and HCW-collected swabs was 84.2% and 89.5%, respectively, with an acceptable agreement, Cohens kappa 0.82, $p < 0.001$. Further, results from a questionnaire answered by the participants found that loss of smell as a self-reported symptom was a strong predictor for a SARS-CoV-2-positive test. In conclusion, we found that self-collected oropharyngeal and nasal swabs for SARS-CoV-2 testing can be reliable compared to HCW-collected oropharyngeal samples.
- Therchilsen, J.H.; von Buchwald, C.; Koch, A.; Dam Nielsen, S.; Rasmussen, D.B.; Thudium, R.F.; Kirkby, N.S.; Raaschou-Pedersen, D.E.T.; Bundgaard, J.S.; Iversen, K.; Bundgaard, H.; Todsen, T. Self-Collected versus Healthcare Worker-Collected Swabs in the Diagnosis of Severe Acute Respiratory Syndrome Coronavirus 2. Diagnostics 2020, 10, 678.

Are self-collected swabs from anterior nares or middle turbinate equivalent to medical-personnel-collected swabs for detecting SARS-CoV-2?

- When we compared SARS-CoV-2 detection from patient-matched nasopharyngeal and saliva samples, we found that saliva yielded greater detection sensitivity and consistency throughout the course of infection. Furthermore, we report less variability in self-sample collection of saliva. Taken together, our findings demonstrate that saliva is a viable and more sensitive alternative to nasopharyngeal swabs and could enable at-home self-administered sample collection for accurate large-scale SARS-CoV-2 testing.
- Saliva is more sensitive for SARS-CoV-2 detection in COVID-19 patients than nasopharyngeal swabs. Anne Louise Wyllie, John Fournier, Arnau Casanovas-Massana, et al. medRxiv 2020.04.16.20067835; doi:https://doi.org/10.1101/2020.04.16.20067835

How close are we to having low cost, mass available testing methods of any type?

- BinaxNow is pretty close!

What is the status of who is paying for testing? Does it look like everyone with and without insurance is going to be covered for unlimited SARS-CoV-2 testing or is this going to come to an end pretty soon?

- Lots of mixed signals like govt shutting down testing sites, opposing funds for testing and tracing, etc. so it is hard to know. However, the Families First Coronavirus Response Act creates a state option to extend Medicaid eligibility to the uninsured for COVID-19 diagnostic testing. This special eligibility option is fully funded by the federal government and in effect as long as the nation is operating under a declared public health emergency. This declaration was recently renewed with no end date specified. Given the magnitude of the pandemic, it is likely that the national state of emergency will be in effect for the foreseeable future.

Is a negative antibody test for SARS-CoV-2 fairly good evidence that infection has not occurred or is that not reliable? Is an antibody test clearly more reliable evidence of SARS-CoV-2 infection soon after a clinic disease syndrome than several months later?

- Antibodies commonly become detectable 1–3 weeks after symptom onset, at which time evidence suggests that infectiousness likely is greatly decreased and that some degree of immunity from future infection has developed. However, additional data are needed before modifying public health recommendations based on serologic test results, including decisions on discontinuing physical distancing and using personal protective equipment.
- https://www.cdc.gov/coronavirus/2019-ncov/lab/resources/antibody-tests-guidelines.html

Is there evidence that health care persons are at high risk of infection if taking a nasal swab specimen without full PPE?

- Protective Practices for Healthcare Providers Performing Nasal (Anterior Nares) Specimen Collection
- For healthcare providers collecting nasal (anterior nares) specimens, or within 6 feet of patients suspected to be infected with SARS-CoV-2:

- Maintain proper infection control and use recommended personal protective equipment (PPE), which includes an N95 or higher-level respirator (or facemask if a respirator is not available), eye protection, gloves, and a gown, when collecting specimens.
- For healthcare providers who are observing patient self-collection of nasal (anterior nares) samples, so are therefore handling specimens, but are not directly involved in collection and not working within 6 feet of the patient:
- Follow Standard Precautions
- Gloves are recommended. Note that healthcare personnel are recommended to wear a form of source control (facemask or cloth face covering) at all times while in the healthcare facility.
- PPE use can be minimized through patient self-collection while the healthcare provider maintains at least 6 feet of separation.

Do you agree that someone should not try to "test out of quarantine" for SARS-CoV-2? In other words, if someone has had potential exposure, that a negative test soon after exposure is not reassuring that they are not infected?

- If a person has had a known exposure to COVID-19 (the CDC defines "exposure" as close contact with someone who has COVID-19), but a negative COVID-19 test, that person should still quarantine and self-monitor for symptoms for 14 days after exposure.
- If a person has not had any known exposure to COVID-19 and is not experiencing symptoms, there is no need to quarantine if a test is negative.
- If symptoms are present but a person has a negative COVID-19 test, that person should still follow home isolation recommendations. In a clinical setting, doctors and nurses may proceed with precautions as though it is a positive diagnosis.

If we get Point-of-Care antigen testing soon, how is the state or country set up to report positives and negatives from individual small physician groups?

- PCR and antigen results must be reported (not antibody tests). Report the results of all COVID-19 diagnostic tests to the Division of Public Health using electronic laboratory reporting ("ELR"). As defined in this Rule, "laboratory" includes any healthcare provider who performs testing in an on-site facility certified by the United States Department of Health and Human Services under the Clinical Laboratory Improvement Amendments of 1988 (CLIA) and implementing regulations, including facilities with a CLIA certificate of waiver.
- Per Rule .0107, healthcare providers who order COVID-19 diagnostic testing in this State shall immediately report the results of all COVID-19 diagnostic tests by secure telefax to the local health director in the county or district where the patient resides. The elements required to be reported are set out in Subparagraph (e)(1) of Rule .0107. Healthcare providers are also required to report the aggregate number of positive and negative nucleic acid COVID-19 diagnostic tests and the aggregate number of positive and negative antigen COVID-19 diagnostic tests per day to the Division of Public Health through the Electronic COVID-19 Aggregate Test Reporting (eCATR) Process.

Will dentists and ophthalmologists and others be doing in-office antigen testing soon?

- Yes. I think that is a good bet.

When to test contacts?

- Early testing may be helpful for contract training, testing at certain times has high false negative rate and testing later means you don't have test results in a useful time period.
- This is the importance of having easily accessible and rapid turnaround on our testing. It's one of the best ways to shut the disease down. Optimal time to test is 5-7 days after exposure.

Discussion of false positive rates?

- If SARS-CoV-2 diagnostic tests were perfect, a positive test would mean that someone carries the virus and a negative test that they do not. With imperfect tests, a negative result means only that a person is less likely to be infected. To calculate how likely, one can use Bayes' theorem, which incorporates information about both the person and the accuracy of the test (recently reviewed5). For a negative test, there are two key inputs: pretest probability — an estimate, before testing, of the person's chance of being infected — and test sensitivity. Pretest probability might depend on local Covid-19 prevalence, SARS-CoV-2 exposure history, and symptoms. Ideally, clinical sensitivity and specificity of each test would be measured in various clinically relevant real-life situations (e.g., varied specimen sources, timing, and illness severity).
- We draw several conclusions. First, diagnostic testing will help in safely opening the country, but only if the tests are highly sensitive and validated under realistic conditions against a clinically meaningful reference standard. Second, the FDA should ensure that manufacturers provide details of tests' clinical sensitivity and specificity at the time of market authorization; tests without such information will have less relevance to patient care.
- Third, measuring test sensitivity in asymptomatic people is an urgent priority. It will also be important to develop methods (e.g., prediction rules) for estimating the pretest probability of infection (for asymptomatic and symptomatic people) to allow calculation of post-test probabilities after positive or negative results. Fourth, negative results even on a highly sensitive test cannot rule out infection if the pretest probability is high, so clinicians should not trust unexpected negative results (i.e., assume a negative result is a "false negative" in a person with typical symptoms and known exposure). It is possible that performing several simultaneous or repeated tests could overcome an individual test's limited sensitivity; however, such strategies need validation.
- False Negative Tests for SARS-CoV-2 Infection — Challenges and Implications https://www.nejm.org/doi/full/10.1056/NEJMp2015897

What to do with conflicting results?

- Several reasons you can get conflicting results – has to do with viral load (many asymptomatic people don't test positive – at least initially). Optimum testing time is 5-7 days after exposure. Also technique is also important. Safest thing is: if you were exposed quarantine.

How good is antigen testing vs molecular?

- Pretty close! See See Physician Guide to POC testing on CCPN website.

What is the scoop on the COVID/flu/RSV hybrid test?

- There's only one that I am aware of that is available for CLIA waived labs – Roche Liat System

What do you tell a patient with a negative COVID test? What if you test 1-3 days after exposure?

- If it's negative and there is high clinical suspicion, tell patient to quarantine and retest in several days.

Should you test 1-3 days after exposure, or ask them to come in later?

- Whether it comes back positive or not depends on clinical suspicion, amount of inoculum, and quality of collection technique. Many asymptomatic carriers won't be positive on first testing.

Recommended workflow for testing when patient presents with symptoms in regards to swabbing for flu first and if negative; test for COVID?

- If flu negative, send for COVID testing, patient wears mask, provide quarantine instructions until results are back

Recommended workflow for asthma spirometry and nebulizer treatments for patients with COVID symptoms, but not tested for COVID yet?

- Would stay away from aerosolized medication. Stick with hand-held metered inhalers.

Would coinfection with influenza worsen the course of COVID-19?

- Experts also aren't certain whether influenza vaccination could help protect against COVID-19 or whether steps taken to mitigate COVID-19 will reduce the burden of the coming flu season.

What about co-infection?

- It definitely can happen, but…"The chances are more likely that they have one or the other," Osterholm said, noting that only 3% or 4% of the population have SARS-CoV-2 infection, while 10% to 20% might become infected with influenza virus, so the odds of being infected with both are small.
- A recent study in JAMA found that out of 1996 patients hospitalized with COVID-19 in metropolitan New York City who were tested for other respiratory viruses, only 42 (2.1%) were coinfected, and only 1 was coinfected with influenza. The patients were hospitalized between March 1 and April 4.
- In Northern California, laboratories that simultaneously tested for SARS-CoV-2 and other respiratory pathogens found a 10-fold higher coinfection rate (20.7%) than the New York study, but only 0.9% of specimens were coinfected with influenza. The authors, who reported their findings in a JAMA research letter, studied 1217 specimens, 116 of which had tested positive for SARS-CoV-2 and 318 for other respiratory pathogens. Of the 116 that were positive for SARS-CoV-2, 24 were positive for at least 1 other respiratory pathogen. However, only 1 of the 116 was positive for influenza.

When is testing important?

- Testing is particularly important for people who are seriously ill. Knowing the diagnosis is important for clinical care because it allows health care workers to protect themselves and is necessary for research into treatments.

- For people who are mildly or moderately ill, testing can help assure that they isolate themselves and alert people they have come in contact with of the potential need for quarantine. By quickly identifying individuals who are sick and isolating them, public health authorities can reduce the spread of the novel coronavirus.
- In many cases, people who have been exposed to the coronavirus should be tested, to inform additional contact tracing efforts.
- To assure both that tests are available for those who need them and that health professionals are prepared to do the test safely, adequate safety equipment is essential. Not every clinic or medical office will conduct the testing. Physicians and public health authorities should direct people to where they can be tested.
- Source: Tom Inglesby - https://www.jhsph.edu/covid-19/questions-and-answers/index.html

What does testing tell us the spread of the virus? What is "percent positive"?

- Public health officials rely on testing results to track the state of the pandemic and policymakers use this information to guide decisions on reopening schools and businesses.
- Percent positive is the percentage of all coronavirus tests performed that are actually positive, or: (positive tests)/(total tests) x 100%. The percent positive (sometimes called the percent positive rate or positivity rate) helps public officials understand the current level of SARS-CoV-2 transmission in the community and whether or not a community is doing enough testing for the number of people who are getting infected.
- Source: David Dowdy and Gypsyamber D'Souza - https://www.jhsph.edu/covid-19/questions-and-answers/index.html

Why aren't there enough tests available and will this change?

- Earlier in the pandemic, the issues were collection devices—not enough swabs or viral transport media (the fluid that the swab goes in).
- Now, the issues are a bit different. The testing process is a very complex system. There are point-of-care tests, which are rapid. And then high-throughput diagnostic tests, which are PCR tests—the ones traditionally done in hospitals, clinical labs, commercial labs, and public health labs. Both those tests are in short supply. Pipette tips—plastic components for test cartridges—are also in short supply.
- There's huge demand from hotspot states and people who want to get tested—so they can go see their relatives or travel, for example. This has been a challenge because we want to make sure we're using testing for the right reasons and right purposes.

How do we get out of this?

- One really good answer is we all need to wear masks, distance, and follow the general rules of hygiene. If we do that, we can bring the curve back down. The curve we speak of is about ICU beds and hospitalizations, but it's actually also about test capacity. We will be able to test as many people as we need to test if we don't have so much transmission. We are not going to be able to massively ramp up production.
- Source: Public Health on Call podcast - https://www.jhsph.edu/covid-19/questions-and-answers/index.html

Can the COVID-19 test tell the difference between someone with an active infection and someone who was infected in the past?

- There are two different types of tests: diagnostic tests and serologic—or antibody—tests. Diagnostic tests detect active infection. Serologic tests look for the presence of COVID-19 antibodies in your blood several weeks after recovery.
- Source: U.S. Food & Drug Administration - https://www.jhsph.edu/covid-19/questions-and-answers/index.html

If you are tested and the test is negative, do you still have to be quarantined?

- If a person has had a known exposure to COVID-19 (the CDC defines "exposure" as close contact with someone who has COVID-19), but a negative COVID-19 test, that person should still quarantine and self-monitor for symptoms for 14 days after exposure.
- If a person has not had any known exposure to COVID-19 and is not experiencing symptoms, there is no need to quarantine if a test is negative.
- If symptoms are present but a person has a negative COVID-19 test, that person should still follow home isolation recommendations. In a clinical setting, doctors and nurses may proceed with precautions as though it is a positive diagnosis.
- Source: Joshua Sharfstein - https://www.jhsph.edu/covid-19/questions-and-answers/index.html

Are false negatives a problem with COVID tests?

- A false negative would mean that you have the disease, but you get a negative test result. It is a falsely negative test that should have been positive.
- There are some concerns about the sensitivity of SARS-CoV-2 diagnostic tests, or the swab tests commonly used in clinical settings.
- If a person has had a known exposure to COVID-19 (the CDC defines "exposure" as close contact with someone who has COVID-19), but a negative COVID-19 test, that person should still quarantine and self-monitor for symptoms for 14 days after exposure.
- If a person has not had any known exposure to COVID-19 and is not experiencing symptoms, there is no need to quarantine if a test is negative.
- If symptoms are present but a person has a negative COVID-19 test, that person should still follow home isolation recommendations. In a clinical setting, doctors and nurses may proceed with precautions as though it is a positive diagnosis.
- Source: Tom Inglesby - https://www.jhsph.edu/covid-19/questions-and-answers/index.html

Can a COVID test read negative if it takes too long to process the sample?

- This has not happened with PCR tests. Antigen tests, or those that look for antibodies, could potentially read positive falsely if they are not processed in a certain period of time.
- Source: Crystal Watson - https://www.jhsph.edu/covid-19/questions-and-answers/index.html

Why isn't the value of contact tracing being realized in the U.S.?

- Right now, there's so much virus circulating in our populations that it's hard for contact tracers to keep up. We have to bring down the number of cases so we can meet that number with the contact tracing capacity that we have.
- We also haven't invested uniformly in contact tracing and building our workforce across the country. We've called for about 100,000 contact tracers—there are currently about 30,000 working across the country.
- Source: Crystal Watson - https://www.jhsph.edu/covid-19/questions-and-answers/index.html