

**2019-nCoV (Coronavirus):
Recommendations and Guidance for Organ Donor Testing**

Updated on July 8, 2020

The AST's Infectious Disease Community of Practice has received queries from transplant and donation colleagues regarding the novel coronavirus (2019-nCoV). The following FAQs were developed with input of members from both the organ donation and transplantation communities to relay information on the current state of knowledge. This document is subject to change as more information becomes available.

Also see UNOS information link: <https://unos.org/covid/>

SARS-CoV-2 Transmission and Implication for Healthcare Centers

The novel coronavirus, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) can spread rapidly within healthcare settings and communities and poses a special challenge for organ transplantation. Person-to-person transmission of SARS-CoV-2 was recognized early in the pandemic and occurs during close exposure (<6 feet) to an infected person, primarily via respiratory droplets produced when the infected person coughs or sneezes. Shedding of high viral titers has been documented from the respiratory tract, including shedding before the onset of symptoms, and results in droplet transmission of SARS-CoV-2 (Zou et al NEJM 2020). Transmission via droplet spread can occur from both symptomatic and asymptomatic individuals who are infected with COVID-19 (Arons et al NEJM 2020). In addition it appears that patients with COVID-19 have the highest viral loads early in the course of their infection. Thus, a reliance on symptom-based screening strategies alone are not sufficient to prevent or diagnose infection; consideration of symptoms, exposure history, with testing is imperative. While stool has tested positive for SARS-CoV-2 in some cases by nucleic acid testing (NAT) including polymerase chain reaction (PCR), it is not known whether this is replicative virus.

Donor Screening in the Era of COVID-19

The epidemiology of SARS-CoV-2 is changing over time and the knowledge base is rapidly expanding. The recommendations suggested below are to assist with specific considerations

regarding screening including testing donors that may arise but are subject to revision as new data accumulate. Some screening considerations are pertinent to both living and deceased donation while other recommendations refer only to one or the other. Finally, it should also be recognized that no test is 100% sensitive or specific and both false positive and false negative results may occur. Accordingly, the risk: benefit ratio for an individual living donor and transplant candidate should always be taken into consideration when making the final decision to perform a transplant. This includes the risk of proceeding with a transplant as well as the risk of deferring and/or potentially foregoing transplantation.

Can SARS-CoV-2 be transmitted from living or deceased donors?

The risk of a COVID-19 infection from an infected living or deceased donor is unknown at this time. Factors that could impact the transmission of SARS-CoV-2 from an organ donor include viability of the virus within the blood and its viability within specific organ compartments of an infected donor. Epidemiologic exposures need to be considered when assessing a donor's risk for infection. Other factors to consider when assessing an organ for transplantation is the risk of the transplant candidate's mortality while on the transplant waitlist, as well as the impact that a COVID-19 donor-derived infection could have on the recipients' medical system and community.

The risk of acquiring COVID-19 from an asymptomatic living donor who has tested negative prior to procurement is low. Additional testing in these cases is performed to protect the procurement and peri-transplant surgeons and medical staff.

How should deceased donors be screened and tested?

Donors should be screened epidemiologically, and by clinical history for suspected COVID-19 infection.

Donor testing recommendations (Table 1):

- Given ongoing, wide-spread community transmission, viral testing of at least one sample from the respiratory tract by NAT for SARS-CoV-2 should be performed within 3 days of procurement.
- In addition, some experts recommend a second viral test to be performed 12-24-hours after the initial test, and within 24-48 hours of procurement, when feasible,. A second test could be considered when suspicion is high and the first test is negative.
- For thoracic organ donors, we recommend that one of the two tests be performed on a lower respiratory tract sample (e.g. tracheal aspirate or BAL sample) when feasible.
- Additional testing for SARS-CoV-2 that may have been performed prior to donation should also be reviewed and made available to evaluating centers.
- For donors who were previously known to have had COVID-19, we would recommend only accepting organs from donors who test negative on NAT-based assays.
 - Given the pulmonary and renal dysfunction associated with SARS-CoV-2 infection and unclear long-term implications thereof, additional evaluation may be required when considering kidney or lung transplantation from donors with previous COVID-19.

- Data regarding the safety of organ donation from donors with previous COVID-19 are extremely limited at this time. In this context, decisions regarding whether to proceed with transplantation must include discussions with the transplant candidate and his or her proxy, as well as consideration of the risk associated with not proceeding with transplantation.
- This is a conservative recommendation and subject to change but takes into consideration that while infectivity is unclear, shedding of virus can be prolonged.
- While ground glass opacification has been well described in patients with confirmed SARS-CoV-2 infection, a CT scan of the chest should not be relied upon as part of a work up to exclude SARS-CoV-2 infection in potential deceased or living donors. This is a non-specific finding and is not an appropriate diagnostic tool in donors when viewed in isolation.

How should living donors be screened and tested?

- Once the surgery date is finalized, the living donors should be counseled to contact the transplant center if they or one of their close contacts (i.e. caring for, living with, visiting, or working) develops COVID-19 so that the timing of the donation surgery can be reassessed in advance.
- Careful consideration should be given when recommending practices to minimize risk, and they should be balanced against feasibility and practicality for donors. This strategy is vital for programs to continue live donor kidney transplants during COVID-19 pandemic (Table 2).
 - Living donors and their support person should be counseled on and encouraged to use preventive strategies, particularly in the 14 days prior to donation to avoid infection.
 - Living donors traveling by air to the transplant center for surgery should be strongly encouraged to self-quarantine for 14 days prior to donation.
 - While self-quarantine is recommended as preventive strategy, it should not be mandatory as some donors may not have an option to work from home. However, self-quarantine for 3 days after the pre-operative COVID-19 testing is recommended .
- Given ongoing, wide-spread community transmission, all living donors should have viral testing of at least one sample from the respiratory tract by NAT for SARS-CoV-2 within 3 days of donation.
 - The exact timing should be guided by local transplant center and hospital policy, and the turn-around time of the test. The test results should be available at least one day before the surgery.
 - Living donors who are part of KPD programs should be tested based on policy of the procuring transplant center.
- We do not recommend using organs from a living donor with active COVID-19 at this time. For living donors who were previously known to have had COVID-19, we would

recommend only considering proceeding to transplant if the donor is at least 28 days from symptom resolution and has a negative NAT.

- Given the renal dysfunction associated with SARS-CoV-2 infection and unclear long-term implications thereof, additional evaluation may be required when considering kidney transplantation from living donors with previous COVID-19.
- Data regarding the safety of organ donation from donors with previous COVID-19 are extremely limited at this time. In this context, decisions regarding whether to proceed with transplantation must include discussions with the transplant candidate and his or her proxy, as well as consideration of the risk associated with not proceeding with transplantation.
- This is a conservative recommendation and subject to change but takes into consideration that while infectivity is unclear, shedding of virus can be prolonged.

Additional donor testing considerations

Recommendations for donor screening and testing may change over time as more data accumulate. It should be recognized that no test is 100% sensitive or specific and false positive and false negative results may occur. Positive and negative predictive values will be impacted by the amount of locally circulating virus, specimen quality and assay performance.

We do not recommend use of NAT from blood or urine at this time.

Antibody testing

Serologic assays for SARS-CoV-2 are increasingly available. At this time, our understanding of the application and interpretation of serologic results is evolving but likely varies with the different testing platforms. Test specificity should be interpreted in the context of the prevalence of SARS-CoV-2 in the region. At this time, there is no recommendation to include these tests in the deceased or living donor screening process. If used, results should be viewed as adjunctive data points rather than as primary definitive information to determine final disposition of a potential donor. Issues to keep in mind include:

- IgM or IgA assays in general have a higher rate of false positive results compared to IgG assays. However, IgM true positive assays usually reflect recent infections, and in this setting the risk of transmission to the procurement team and the recipient must be considered.
- IgG positive assays may reflect passive antibody from blood products or immunoglobulin
- It is anticipated that a person with prior COVID-19 disease who has recovered will be IgG positive, but it is not certain how long IgG positivity is maintained

OPTN Policy 2.2 (OPO Responsibilities), #15, requires storage of blood for all deceased donors which could be used to retrospectively look for positive donor serology if needed.

- While not mandated, storage of respiratory or other specimens, in a fashion suitable for PCR testing may also be valuable if subsequent donor derived infection is suspected.

Table 1: Deceased Donor Testing Recommendations

<p>Screening:</p> <ul style="list-style-type: none">▪ Viral testing of at least one sample from the respiratory tract by NAT for SARS-CoV-2 should be performed within 3 days of procurement• Consider a second viral test to be performed 12-24hours after the initial test, and within 24-48 hours of procurement, whenever feasible. A second test could be strongly considered when suspicion is high and the first test is negative.
<p>Thoracic Organs:</p> <ul style="list-style-type: none">▪ One of the two screening NAT tests should be performed on a lower respiratory tract sample (e.g. tracheal aspirate or BAL sample), whenever feasible
<p>Deceased Donors with previous COVID-19 infection</p> <ul style="list-style-type: none">▪ Data regarding the use of organs from donors with previous COVID-19 infection are limited at this time▪ Consider only donors who are at least 28 days from symptom resolution and NAT negative▪ Given the renal dysfunction associated with SARS-CoV-2 infection and unclear long-term implications thereof, additional evaluation may be required when considering kidney transplantation from living donors with previous COVID-19

Table 2: Recommendations to Mitigate the Risk of COVID-19 Transmission from Living Donors and Prevent Harm to the Donor

<p>Preventive methods to decrease risk of SARS-CoV-2 infection:</p>
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- Self-quarantining, when feasible, especially for donors traveling by air
- Frequent hand washing
- Maintaining social distancing
- Mask or face covering if out in public

Screening:

- All living donors should have viral testing of at least one sample from the upper respiratory tract by NAT for SARS-CoV-2 as close to donation as possible, but no longer than 3 days prior to surgery.

Contraindications to donation:

- Any living donor with active COVID-19 infection
- Consider delaying transplant for asymptomatic living donors with a known exposure history within the previous 14 days

Living Donors with Previous COVID-19 infection

- Data regarding the use of organs from donors with previous COVID-19 are extremely limited at this time
- May consider donation if the donor is at least 28 days from symptom resolution and has a negative COVID-19 NAT.
- Further evaluations need to be considered for previously COVID19 infected kidney and lung donors

The current outbreak is unpredictable. During widespread community-transmission, healthcare infrastructure and capacity issues may have further impact on donation and transplantation. These recommendations will be regularly updated to account for the changing epidemiology and new information regarding treatment and testing.

References:

1. Arons MM, Hatfield KM, Reddy SC, et al. Presymptomatic SARS-CoV-2 infections and transmission in a skilled nursing facility. *N Engl J Med* 2020;382:2081-2090.
2. Bai Y, Yao L, Wei T, et al. Presumed asymptomatic carrier transmission of COVID-19. *JAMA* 2020;323:1406-1407.
3. Kimball A, Hatfield KM, Arons M, et al. Asymptomatic and presymptomatic SARS-CoV-2 infections in residents of a long-term care skilled nursing facility — King County, Washington, March 2020. *MMWR Morb Mortal Wkly Rep* 2020;69:377-381.
4. Sakurai, A, Sasaki, T. et al. Natural History of Asymptomatic SARS-CoV-2 Infection. *N Engl J Med* 2020 DOI: 10.1056/NEJMc2013020
5. Zou L, Ruan F, Huang M, et al. SARS-CoV-2 viral load in upper respiratory specimens of infected patients. *N Engl J Med* 2020;382:1177-1179
6. To KK-W, Tsang OT-Y, Leung W-S, et al. Temporal profiles of viral load in posterior oropharyngeal saliva samples and serum antibody responses during infection by SARS-CoV-2: an observational cohort study. *Lancet Infect Dis* 2020 March 23
7. Van Doremalen et al. Aerosol and Surface Stability of SARS-CoV-2 as Compared with SARS-CoV-1. *N Engl J Med* 2020; 382:1564-1567
8. Woloshin S, Patel N, Kesselheim, A et al. False Negative Tests for SARS-CoV-2 Infection — Challenges and Implications. *N Engl J Med* 2020 DOI: 10.1056/NEJMp2015897
9. Yang Y, Yang M, Shen C, et al. Evaluating the accuracy of different respiratory specimens in the laboratory diagnosis and monitoring the viral shedding of 2019-nCoV infections. February 17, 2020 (<https://www.medrxiv.org/content/10.1101/2020.02.11.20021493v2>. opens in new tab).
10. Zhao J, Yuan Q, Wang H, et al. Antibody responses to SARS-CoV-2 in patients of novel coronavirus disease 2019. *Clin Infect Dis* 2020 March 28
11. Arevalo-Rodriguez I, Buitrago-Garcia D, Simancas-Racines D, et al. False-negative results of initial RT-PCR assays for COVID-19: a systematic review. April 21, 2020