Donated kidneys from deceased COVID patients can be safely transplanted

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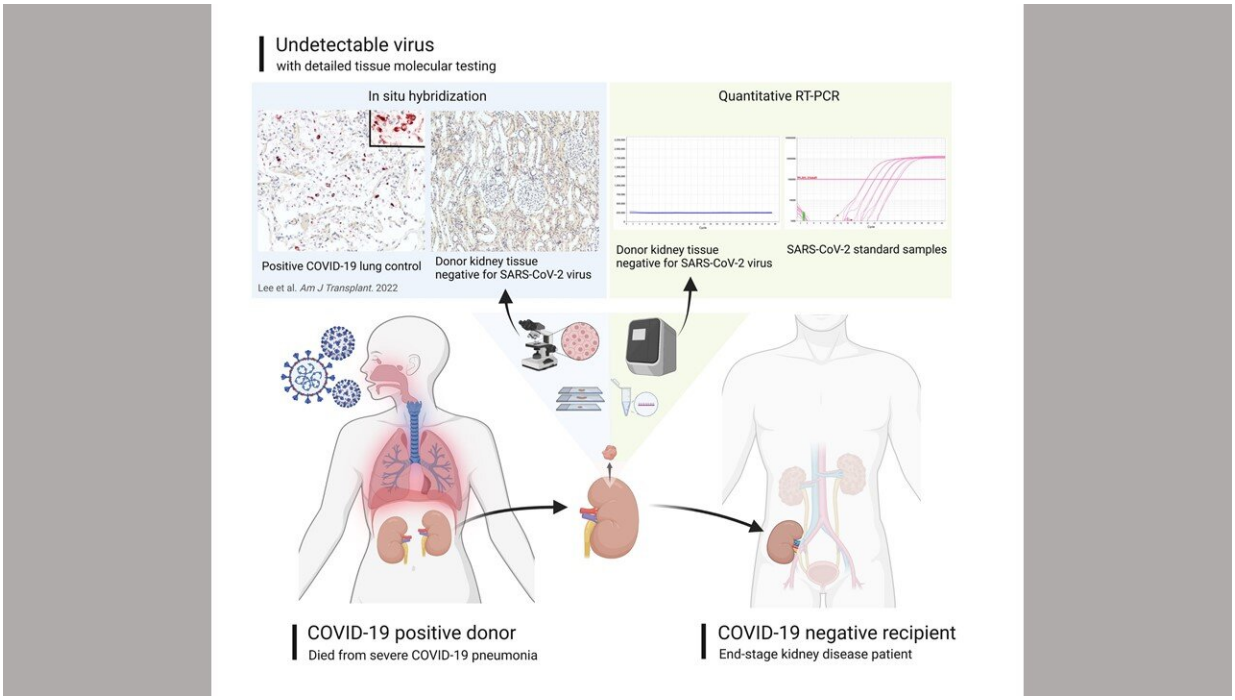

Credit: Kyungho Lee, BioRender.com

Researchers at Johns Hopkins Medicine report the successful and safe transplantation of a kidney from a donor who died of complications from COVID-19. The case, which involved careful collection and sensitive molecular testing of the donor organ for evidence of the virus, demonstrates that healthy kidneys from such donors, previously discarded, can be safe to transplant.

While some kidneys from deceased donors infected with the coronavirus have been successfully transplanted in the United States since the start of the pandemic, the Johns Hopkins Medicine investigators say their transplant is one of the first documented cases in which tissue samples from the donor were analyzed with sophisticated tools that can detect molecular evidence of the virus. A report on the methods used and the transplant outcome was published Jan. 13 in the *American Journal of Transplantation*.

Concerns have emerged about the use of such donor kidneys because the kidneys could be a target of infection for the virus, based on autopsy findings and high levels of virus receptors in kidneys.

"What distinguishes this case from others is the fact that we studied the donor kidney by using pre-transplant biopsy samples to investigate the presence of the virus," said Kyungho Lee, M.D., a Johns Hopkins Medicine fellow and first author of the manuscript. "Instead of just doing a nasal swab test on the recipient after the transplant to check for infection after the fact, we obtained the donor kidney tissue prior to transplant and studied it carefully," he said.

Lee cautioned that large studies are needed to confirm the validity of the molecular analysis he and his team used, and to track the long-term outcome of recipients of such donor organs. Currently, there are no standardized tissue-based testing platforms or validated protocols to follow.

To test donor samples for virus, the researchers used a standard PCR test, which amplifies genetic material from the virus, along with another sensitive technique known as in situ hybridization.

"In this case, surgeon Dr. Desai informed me that an organ was available, but other centers had turned it down because the donor died

from COVID-19 complications," says Hamid Rabb, M.D., medical director of the Johns Hopkins Kidney Transplant Program and corresponding author of the published report. Rabb and his team, based on the limited data in the field, agreed that the organ had a good chance of being used safely for the recipient, but decided to assess the risk by using precise molecular methods to evaluate infection in the donor organ.

The donor patient, the team reported, was a woman in her early 30s who was otherwise very healthy for her age, but was admitted to the hospital in March 2021 due to severe COVID-19 pneumonia and eventually placed on extracorporeal membrane oxygenation (ECMO), which is a blood pump outside the body to give oxygen to the body. She developed hypoxic brain injury (when not enough oxygen is being supplied to the brain) and progressed to brain death. Her kidney function was stable during her hospital course, and she tested negative for the virus by nasal swab three days prior to donation.

Tissue samples from the donor's kidney and aorta (a blood vessel known to have a high level of receptors for SARS-CoV-2, the virus that causes COVID-19) were collected and tested by PCR and by in situ hybridization. The samples were then compared with a separate positive COVID-19 case for accurate data interpretation.

The recipient patient was a 55-year-old man with end-stage kidney disease who had been on dialysis for more than five years. The Johns Hopkins Medicine patient had no prior COVID-19 history, was fully vaccinated and tested negative for the virus on the day of transplantation. Since the procedure, which occurred within 24 hours of the donor's death, the recipient has tested negative for COVID-19 by a PCR nasal swab test 20, 30 and 90 days following the transplantation, and has shown no signs or symptoms of the virus.

As of publication, the recipient has been off dialysis with excellent kidney function since the transplant, says Niraj Desai, M.D., surgical director of the Kidney and Pancreas Transplant program at Johns Hopkins Medicine. Desai says there have been about a dozen kidney and liver transplants from COVID-19-positive donors since this case, but this specific case was unique in that sophisticated tissue molecular testing was performed to provide hard data to justify using these organs.

"Some of this was a leap of faith, based on experience throughout the years with donors who had other viral infections such as hepatitis C," Desai said. "Although this case wasn't exactly like those others, we had some measure of confidence in a safe outcome."

Rabb says decisions on whether to accept organs other than lungs from donors who have died from COVID-19-related causes should be made on a case-by-case basis, but the risk of COVID-19 transmission through kidney transplant appears to be very low based on his team's cases to date.

"We know our case may not be representative of many possible COVID-19 donors, particularly since the donor was negative for COVID-19 at the time of transplantation," says Rabb. "However, it's a step forward using highly sensitive molecular testing to show it can be safe to use organs from deceased COVID-19 donors. Organs can be individually considered for kidney transplant instead of being routinely discarded."

According to the U.S. Department of Health and Human Services, some 95,000 Americans with kidney failure are awaiting donor organs. As reported by the U.S. Centers for Disease Control and Prevention, nearly 9,000 of these patients drop off the wait list each year because they cannot get a kidney in time, resulting in death or deteriorating health that makes transplantation no longer possible.

More information: Kyungho Lee et al, Successful kidney transplantation from a deceased donor with severe COVID-19 respiratory illness with undetectable SARS-CoV-2 in donor kidney and aorta, *American Journal of Transplantation* (2022). DOI: 10.1111/ajt.16956

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