

Interview



Prof Hamid Rabb

Professor of Medicine and Medical Director of the Johns Hopkins Kidney Transplant Program

Regarding the current COVID-19 pandemic, could you explain how the virus affects the kidneys, and the result this has in those infected?

Severe acute respiratory syndrome coronavirus-2 (SARS CoV-2) can affect the kidneys in a number of ways: 1) patients with COVID-19 pneumonia have generalised inflammation and pro-coagulant status, which in turn causes kidney inflammation, injury, and decreased function; 2) patients with severe COVID-19 infections can have fluctuations and drops in blood pressure, impairing kidney blood flow and thus causing kidney dysfunction; 3) the SARS Co-V-2 can directly infect kidney tubular cells and podocytes, causing damage, white blood cell infiltration, and acute kidney injury.

Recent publications have discussed kidney transplant programmes during the pandemic. What are your thoughts on the potential safety concerns?

Patients who have undergone kidney transplant are at particular risk of worse outcomes after COVID-19, like other immunocompromised patients. During the early stage of transplant, immunosuppression needs to be very high, making the patient particularly vulnerable. There is also a risk that the patient can catch COVID-19 from

a deceased or live donor, and aggressive testing of donors is being performed to reduce that risk. Furthermore, there is a risk that the patient receiving a transplant can catch COVID-19 while hospitalised or during a follow-up visit. For these reasons, many programmes have temporarily suspended live donor kidney transplantation, and significantly reduced deceased donor kidney transplantation. Patients running out of dialysis access, those who are very highly human leukocyte antigen sensitised and might not get another transplant offer, and paediatric cases are some groups that continue to be transplanted in many programmes.

Could you summarise the major challenges that patients with kidney disease face when dealing with COVID-19, which you have examined in your recent viewpoint article 'Kidney diseases in the time of COVID-19: major challenges to patient care.'

Patients with kidney diseases are quite vulnerable to COVID-19 due to their comorbidities, often diabetes, hypertension, and other cardiovascular diseases. Those treated with in-centre dialysis need to go to dialysis centres, which despite the best precautions, may have difficulty with isolation. I have already mentioned the issues with kidney transplantation. Furthermore, when patients without kidney disease become ill with COVID-19

and then develop acute kidney injury (AKI), AKI is a multiplier that significantly increases risk of death. In many hospitals, there are so many patients with COVID-19-induced kidney complications needing dialysis that dialysis supplies are running out, and there are inadequate staff to carry out this highly skilled procedure. Furthermore, due to increased blood clotting in COVID-19 patients, continuous dialysis circuits can clot off which makes dialysis less efficient and further increases the need for dialysis supplies.

"Patients with kidney diseases are quite vulnerable to COVID-19 due to their comorbidities, often diabetes, hypertension, and other cardiovascular diseases."

Following on from this, how do you suggest we address these challenges?

The COVID-19 pandemic has led to a surge of mainly clinical and some lab-based reports on how COVID-19 affects the kidney, how to reorganise dialysis and transplant programmes, and how to treat COVID-19 in patients with kidney diseases. However, research is in its infancy, and there is a great need to mobilise kidney researchers and resources to properly conduct research to improve outcomes in these patients.

As a nephrologist, could you comment on any other patient groups who are immunocompromised that are likely to be affected by COVID-19 and what advice you would give to their healthcare providers?

Kidney disease patients, either on dialysis or post-transplant, are closely followed by the health system and thus, there is an opportunity for other groups of vulnerable patients to learn from these experiences. Patients with cancers, rheumatologic diseases being treated with immunosuppression, and patients with other immunodeficiencies need to be followed particularly closely, practise even stricter social distancing than advised for the general population, may shed the virus for longer times than others, and need to rapidly contact their healthcare team at the outset of even minor symptoms. It also is possible that immunocompromised patients may have less overt symptoms such as fever due to a suppressed inflammatory response.

Johns Hopkins has been a stand-out institution during this time, offering the interactive map of infections and recoveries worldwide; how does it feel to be affiliated

with an institution performing such seminal work?

I feel very fortunate to work with such talented and dedicated faculty, students, nursing, and staff. Johns Hopkins is a unique institution that was initially established to conduct research but also educate academic leaders and provide compassionate care. The warm collegiality and high density of committed individuals facilitates excellence for both local and international impact. I heard a half-joke from a senior faculty that Johns Hopkins Medicine's being located in a relatively underserved neighbourhood, plus fewer perks for faculty and trainees compared to private hospitals, actually "negatively selects" our members for more traditional values of medicine rather than more modern values like "work-life balance." During this crisis, the values and principles of the people at Johns Hopkins have really shone through and continued to distinguish the institution.

A research interest of yours is the molecular pathogenesis of kidney ischaemia/reperfusion recovery. How will the pandemic affect the development of treatment options for patients with this condition?

My team's research for the last 25 years has been to elucidate the mechanisms of how inflammation, particularly by white blood cells, leads to AKI and mediates repair. We have also pioneered the mechanistic concept of how the injured lung and kidney modify each other's function during critical illness. Coincidentally, both lines of research are front and centre during COVID-19 infections. We have started a series of studies, both at our institution and collaborating with others in the USA and Italy, evaluating the molecular aspects of COVID-19 effects on the kidney, and harnessing our understanding of these mechanisms to improve outcomes for COVID-19 patients. Of course, there are many challenges, which include how to develop the best experimental models for COVID-19-induced kidney disease, logistics of conducting discovery research during institutional and public restriction of activities, as well as a shift in attention of physician-scientists and resources towards direct care of infected patients.