

COVID-19 are dangerous to the kidneys in any situation, not only in a pandemic: LONG-COVID-19 and kidney disease

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The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) posed a major threat to health care and medical staff from the start of the epidemic, but its impact will extend beyond this pandemic and into the future [1]. The kidney is one of the organs that has been infected with SARS-CoV-2. Podocytes, proximal renal tubular cells, and glomerular endothelial cells, as well as perhaps mesangial cells and Bowman's capsule epithelium, exhibit the essential angiotensin converting enzyme type 2 (ACE2) for viral entry. The expression of ACE2 in the kidneys is extremely high, maybe 100 times higher than in the lungs [2]. Infected individuals have much higher levels of angiotensin 2 in their blood, which activates the renin-angiotensin system, causing extensive endothelial dysfunction [3]. Patients who have had coronavirus disease 2019 (COVID-19)-induced acute kidney injury (AKI) are not uncommon these days, and they have a significantly increased risk of developing progressive chronic kidney disease (CKD) as a result of their treatment. Mechanical breathing, continuous renal replacement treatment, and extracorporeal membrane oxygenation are frequently used to help patients with severe and critical COVID-19 [4]. AKI is detected in around 28% of COVID-19 patients who are hospitalized, and 9% of these patients who undergo kidney replacement treatment [5]. However, given the growing body of evidence, it appears that it is not just the survival of AKI associated with COVID-19 that can cause damage to kidney disease associated with

COVID-19. COVID-19 increased the risk of CKD, according to United States research that utilized electronic health data from the Veterans Health Administration to conduct a complete evaluation of lengthy COVID-19. This risk was largest among individuals who had severe illness. Even beyond the first 30 days after diagnosis of COVID-19, unfavorable renal symptoms such as urinary tract infections, AKI, and CKD occurred in individuals who required hospitalization [6]. Patients with COVID-19 in China, which indicated that 6 months after COVID-19 hospitalization, 35% of patients had impaired kidney function (estimated glomerular filtration rate [eGFR] < 90 mL/min/1.73 m²). Surprisingly, during follow-up, 13% of patients who did not develop AKI during hospitalization showed a decrease in eGFR [7]. In a study of more than 1.7 million persons, 90,000 of whom were COVID-19 survivors with symptoms lasting at least 30 days, it was shown that roughly 5% of them had a 30% drop in a vital measure of kidney function (eGFR). This means that those infected with LONG-COVID-19 were 25% more likely than uninfected people to acquire a 30% drop in eGFR, with a larger risk in those who survived the more severe sickness. However, the condition impacted many patients who were not hospitalized [8]. From the perspective of some studies, which indicate that 5% of vaccinated patients develop LONG-COVID-19, and in the unvaccinated group, 11% may pose a serious nephrology challenge during and after the pandemic itself, when we deal with a huge percent-

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age of patients with ailments of the kidneys [9]. Clinicians who must pay close attention to kidney function evaluation will play a critical role, not only in the group of hospitalized patients, but also in the group of seemingly asymptomatic patients, and notably in the group of patients with LONG-COVID-19. Vaccinations also play an important role in reducing the risk of serious illness, hospitalization, and complications such as LONG-COVID-19. In the current epidemiological crisis, it is critical to vaccinate as many people as possible in order to protect them against the long-term impacts of complications from the pandemic. We must also remember that vaccinated people may also become ill, even mildly, and suffer complications even after an asymptomatic form of the disease, so remember to wear masks and social distance [10].

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