

Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active. an opposite seeming improvement of kidney function with an eGFR of 90 mL/min per 1.73 m^2 or more in 142 (29.7%) of 478 patients at follow-up with an eGFR of less than 90 mL/min per 1.73 m^2 and no evidence of acute kidney injury during the acute disease. We encourage the investigators to show eGFR trajectories between acute phase and followup independent from cutoffs to substantiate the robustness of their findings.

We declare no competing interests.

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- 1 Huang C, Huang L, Wang Y, et al. 6-month consequences of COVID-19 in patients discharged from hospital: a cohort study. *Lancet* 2021; **397:** 220–32.
- 2 Levey AS, Stevens LA, Schmid CH, et al. A new equation to estimate glomerular filtration rate. Ann Intern Med 2009; **150**: 604–12.
- 3 Hilderink JM, van der Linden N, Kimenai DM, et al. Biological variation of creatinine, cystatin C, and eGFR over 24 hours. *Clin Chem* 2018; **64:** 851–60.

Chaolin Huang and colleagues¹ have highlighted the putative renal consequences of COVID-19 at 6 months from discharge. A decreased estimated glomerular filtration rate (eGFR) was defined as less than 90 mL/min per 1.73 m² and was observed in 35% of participants during follow-up. The term decreased eGFR is ambiguous. According to the mean age of the cohort, chronic kidney disease should be defined as an eGFR of less than 60 mL/min per 1.73 m².² The usual prevalence of eGFR less than 90 mL/min per 1.73 m² in the Chinese general population of similar ages to those in Huang and colleagues' cohort ranges between 35% and 50%.^{3,4} In other words, the prevalence of eGFR of less than 90 mL/min per 1.73 m² in COVID-19 survivors might not differ from the general population. Furthermore, the majority of patients with eGFR less than 90 mL/min per 1.73 m² during follow-up did not show acute kidney injury during the acute phase, which suggests that the eGFR of these patients was already less than 90 mL/min per 1.73 m² before COVID-19. Therefore, the prevalence of patients with eGFR less than 60 mL/min per 1.73 m² at 6 months from discharge is required to factually assess the long-term effect of COVID-19 on renal function. The pathological relevance of an eGFR between 60 and 90 mL/min per 1.73 m² is questionable in the absence of proteinuria.² Proteinuria has been frequently described in patients with COVID-19. Our follow-up observations suggest a spontaneous remission within a few weeks after discharge.5 The available data of Huang and colleagues do not support their alarming conclusions about the poor renal prognosis at 6 months after COVID-19.

We declare no competing interests.

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- Huang C, Huang L, Wang Y, et al. 6-month consequences of COVID-19 in patients discharged from hospital: a cohort study. Lancet 2021; 397: 220-32.
- Delanaye P, Jager KJ, Bökenkamp A, et al. CKD: a call for an age-adapted definition. J Am Soc Nephrol 2019; **30:** 1785–805.
- Zhang L, Wang F, Wang L, et al. Prevalence of chronic kidney disease in China: a crosssectional survey. *Lancet* 2012; **379:** 815–22.
 Wang S, Chen R, Liu O, Shu Z, Zhan S, Li Li
 - Wang S, Chen R, Liu Q, Shu Z, Zhan S, Li L. Prevalence, awareness and treatment of chronic kidney disease among middle-aged and elderly: The China Health and Retirement Longitudinal Study. *Nephrology (Carlton)* 2015; **20**: 474–84.
 - Huart J, Bouquegneau A, Lutteri L, et al. Proteinuria in COVID-19: prevalence, characterization and prognostic role. J Nephrol 2021; **34:** 355–64.

Authors' reply

In our study,1 we observed a considerable number of patients presenting with low estimated glomerular filtration rate (eGFR) over time without acute kidney injury and an eGFR of 90 mL/min per 1.73 m² or more during hospitalisation. Another study has shown that the use of creatinine to diagnose acute kidney injury might underestimate the patients with acute kidney injury at acute phase.² We found that reduced eGFR at follow-up is possibly associated with kidney injury at acute phase, which was not recognised on the basis of serum creatinine values.

Philipp Enghard and colleagues reported that other factors (eq, hydration) could lead to fluctuations of serum creatine values and further affect the calculated eGFR values. Patients categorised into the group with an eGFR of 90 mL/min per 1.73 m² or more at acute phase all had eGFR values that were 90 mL/min per 1.73 m² or more during hospitalisation. According to our data, 1366 (80.1%) of 1703 had at least two eGFR values and 956 (56.0%) of 1703 patients had at least three eGFR values, which, to some extent, excluded the possibility of misclassification resulting from fluctuations. For the eGFR value at 6 months after symptom onset. fluctuations might have existed, as the value was obtained once. However, attention should be paid to the group of people that had a lower eGFR value after discharge than at acute phase and are at risk of longterm kidney damage, and who need help from health-care providers and further follow-up to differentiate kidney damage from fluctuation or physiological decrease.

Pierre Delanaye and colleagues reported that among patients without acute kidney injury during acute phase, an eGFR less than 90 mL/min per 1.73 m² during followup might be attributable to lowered eGFR before COVID-19. For patients

