



## Reply to: Hypertension and severe COVID-19

Shigeru Shibata<sup>1</sup> · Kei Asayama<sup>2</sup> · on behalf of the Japanese Society of Hypertension project team on COVID-19

**Keywords** Coronavirus disease 2019 · Blood pressure · Covariates

Received: 25 January 2023 / Accepted: 30 January 2023 / Published online: 27 February 2023  
© The Author(s), under exclusive licence to The Japanese Society of Hypertension 2023

We thank Kow et al. for their thoughtful comments [1] on our review article titled “COVID-19 pandemic and hypertension: an updated report from the Japanese Society of Hypertension project team on COVID-19” [2]. In our article, we noted that evidence is mixed regarding the association between hypertension and severe COVID-19, and referred to a possibility that the quality of blood pressure control can affect the clinical course of the cardiovascular complications.

As they emphasized [1], the recent meta-analysis showed that the association of hypertension with COVID-19 mortality in crude analysis disappeared after adjustment with strong predictors of mortality [3], supporting the non-straightforward relationship between these two disorders. The importance of appropriate assessment and adjustment of crucial risk factors has also been highlighted by the findings of the CAPACITY-COVID registry [4]. In that international registry designed to gather information on cardiovascular diseases in patients with COVID-19, the significant association between hypertension and in-hospital mortality in COVID-19 patients disappeared after adjustment of age and other hypertension-related covariates [4]. Another important aspect that needs attention in considering the association between the two disorders is the variation in the methods for the demographic data collection and in the definition of hypertension [5].

Kow et al. also pointed out the role of the immune system as a potential mechanism linking hypertension and severe COVID-19 [1]. Whether an altered peripheral

immune cell composition (and other changes in the innate immune system) in hypertension is linked to the clinical course of SARS-CoV-2 infection is an interesting issue that deserves further investigation [6]. Lastly, we are encouraged that we share a common direction in reemphasizing the importance of adequate blood pressure control in hypertensive patients during the current pandemic [1, 2].

### Compliance with ethical standards

**Conflict of interest** The authors declare no competing interests.

**Publisher's note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

### References

1. Kow CS, Ramachandram DS, Hasan SS. Hypertension and severe COVID-19. *Hypertens Res.* 2023. <https://doi.org/10.1038/s41440-023-01207-z>.
2. Shibata S, Kobayashi K, Tanaka M, Asayama K, Yamamoto E, Nakagami H, et al. COVID-19 pandemic and hypertension: an updated report from the Japanese Society of Hypertension project team on COVID-19. *Hypertens Res.* 2022;1–12. <https://doi.org/10.1038/s41440-022-01134-5>.
3. D'Elia L, Giaquinto A, Zarrella AF, Rendina D, Iaccarino Idelson P, Strazzullo P, et al. Hypertension and mortality in SARS-COV-2 infection: a meta-analysis of observational studies after 2 years of pandemic. *Eur J Intern Med.* 2022;108:28–36. <https://doi.org/10.1016/j.ejim.2022.11.018>.
4. McFarlane E, Linschoten M, Asselbergs FW, Lacy PS, Jedrzejewski D, Williams B, et al. The impact of pre-existing hypertension and its treatment on outcomes in patients admitted to hospital with COVID-19. *Hypertens Res.* 2022;45:834–45.
5. Shibata S, Arima H, Asayama K, Hoshide S, Ichihara A, Ishimitsu T, et al. Hypertension and related diseases in the era of COVID-19: a report from the Japanese Society of Hypertension Task Force on COVID-19. *Hypertens Res.* 2020;43:1028–46.
6. Kresovich JK, Xu Z, O'Brien KM, Parks CG, Weinberg CR, Sandler DP, et al. Peripheral immune cell composition is altered in women before and after a hypertension diagnosis. *Hypertension.* 2023;80:43–53.

✉ Shigeru Shibata  
shigeru.shibata@med.teikyo-u.ac.jp

<sup>1</sup> Division of Nephrology, Department of Internal Medicine, Teikyo University School of Medicine, Tokyo, Japan

<sup>2</sup> Department of Hygiene and Public Health, Teikyo University School of Medicine, Tokyo, Japan