

## Authors' reply

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Dear Sir,

We thank the author for his comments on our editorial.<sup>(1,2)</sup> While neurotropic viruses such as those from the herpesviruses and Japanese encephalitis are well known to cause neuroinvasive disease, respiratory viruses such as influenza, respiratory syncytial virus, human coronavirus and metapneumovirus have been associated with neurological symptoms including seizures, encephalopathy, encephalomyelitis and Guillain-Barré Syndrome.<sup>(3)</sup> The exact mechanism of these conditions is not always clear.

While novel coronaviruses present predominantly with respiratory symptoms, there have been reports of neurological manifestations in rare instances. The severe acute respiratory syndrome coronavirus (SARS-CoV) has been found in the cerebrospinal fluid of SARS-infected patients who presented with seizures;<sup>(3)</sup> neuromuscular complications have been described in patients with Middle East respiratory syndrome;<sup>(4)</sup> and interestingly, human coronavirus OC43 was associated with fatal encephalitis in an 11-month-old boy who had undergone cord blood transplantation for severe combined immunodeficiency.<sup>(5)</sup>

Thus far, there have been no specific published reports on neurologic involvement associated with coronavirus disease 2019 (COVID-19). In a case series of 99 patients with COVID-19 in Wuhan, China, 8% had headache and 9% had confusion,<sup>(6)</sup> while 6.5% of 138 hospitalised patients had headache in another case series in Wuhan.<sup>(7)</sup> It is certainly difficult to differentiate headache due to central nervous system involvement from the febrile viral syndrome. Brain imaging or lumbar puncture may be needed, which is tricky when dealing with a contagious virus such as SARS-CoV-2. While these early case series are merely the tip of the iceberg, it is possible that subsequent reports of COVID-19-associated neurologic manifestations may emerge as the pandemic evolves.

Yours sincerely,

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