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# NEUROPATHOLOGY OF COVID-19: WHERE ARE THE NEUROPATHOLOGISTS?

Markus Glatzel

The effects of COVID-19, a global pandemic caused by infection with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) have been discussed in all possible and impossible media channels. Assessment of the pathophysiology of COVID-19 will be key to design therapeutic approaches and to understand and manage possible long term effects of the disease on coronavirus survivors. COVID-19 can be found in the brain, and may present with a wide range of neurological features ranging from mild and transient symptoms such as anosmia and dizziness to severe conditions including strokes and possibly even encephalitis (2,4).

Thus, careful neuropathological assessment of relevant brain regions using the full panel of neuropathological methods by expert teams with documented expertise in neuropathology is the way forward. It is an expert task to dissect out which changes are attributed to direct SARS-CoV-2-induced damage and which changes are attributed to SARS-CoV-2 overreaction of the immune system. All of these changes will have to be mapped against neuropathological alterations seen in severely diseased, mainly older patients and against neuropathological alterations caused by long-term intensive care treatment, which may include extracorporeal membrane oxygenation a procedure known to induce intracranial hemorrhagic lesions.

Unfortunately, this is not what is happening. At the time of writing of this editorial, published data on the neuropathology of COVID-19 come from rather small case series without obvious involvement of researchers with documented expertise in neuropathology and the described neuropathological findings could not be more disparate. One study describes explicitly, that there are no signs of encephalitis and nervous system vasculitis, whereas another study describes just the opposite, pan-encephalitis and diffuse petechial hemorrhage in the entire brain (5,6). It remains to be seen which of these studies stands up to the most rigorous peer review one could imagine, assessment by the neuropathological community. It is now time to join forces to design and execute rigorous neuropathological studies on COVID-19. The International Society of Neuropathology has launched a platform which should facilitate this ([www.intsocneuropathol.com/](http://www.intsocneuropathol.com/)). But it is also time for editors of medical journals to see to it, that papers on the neuropathology of COVID-19 are handled in the most efficient way possible, to publish relevant data fast, but also not to forget that these papers should not increase the already existing entropy concerning COVID-19. At Brain Pathology, we have a long history of publishing rigorously controlled papers on the neuropathology of pathogen-induced diseases and we are up to the challenge (1,3).

## REFERENCES

1. Irons DL, Meinhardt T, Allers C, Kuroda MJ, Kim WK (2019) Overexpression and activation of colony-stimulating factor 1 receptor in the SIV/macaca model of HIV infection and neuroHIV. *Brain Pathol* 29:826–836.
2. Mao L, Jin H, Wang M, Hu Y, Chen S, He Q *et al* (2020) Neurologic manifestations of hospitalized patients with coronavirus disease 2019 in Wuhan, China. *JAMA Neurol* 77:683–690.
3. Mejia Maza A, Carmen-Orozco RP, Carter EC, Dávila-Villacorta DG, Castillo G, Morales JD *et al* (2019) Axonal swellings and spheroids: a new insight into the pathology of neurocysticercosis. *Brain Pathol* 29:425–436.
4. Puelles VG, Lutgehetmann M, Lindenmeyer MT, Sperhake JP, Wong MN, Allweiss L *et al* (2020) Multiorgan and renal tropism of SARS-CoV-2. *N Engl J Med*.
5. Schaller T, Hirschbühl K, Burkhardt K, Braun G, Trepel M, Markl B, Claus R (2020) Postmortem examination of patients with COVID-19. *JAMA*.
6. von Weyhern CH, Kaufmann I, Neff F, Kremer M (2020) Early evidence of pronounced brain involvement in fatal COVID-19 outcomes. *Lancet*, 6736:31282–31284.