**Neurological and psychiatric presentations in COVID-19 and neuroprotective treatment potential of recombinant human erythropoietin**

The outbreak of SARS-CoV-2 in Wuhan by the end 2019 was initially associated with a severe form of pneumonia. It became soon clear that the course is highly variable, that multiple organs – outside the lung - are affected, especially the nervous system. Age, gender, prior comorbidities, viral dose, variations in viral and host genomes influence the course of COVID-19. Airborne transmission has been identified as the dominant route for the spread of SARS-CoV-2. Neurological manifestations include nonspecific complaints such as confusion, headache, myalgia, etc. but also complaints specific to the nervous system such as anosmia, ageusia, cerebral vascular insults (strokes), subarachnoid and cerebral hemorrhages, and demyelinating disorders such as Guillain-Barre-Syndrome, demyelinating lesions in brain and spine, etc. SARS-CoV-2 infection has also been implicated with psychiatric disorders; COVID-19 survival is associated with high risk for persistence of symptoms. There are several mechanisms that have been invoked on pathological levels: coagulation abnormalities, cytokine storm, molecular mimicry, hypoxia and viral infection. The damage to different organs calls for a tissue-protective approach, in particular neuroprotection. Based on prior experience we propose erythropoietin (EPO) as candidate for supportive treatment of severe COVID-19. Prior clinical studies on EPO in chronic brain diseases with extend treatment using high-dose EPO over many weeks showed consistently advantageous effects on cognition, motor function and even reduction of brain matter loss. We hypothesize that EPO treatment has positive effects on clinical course and outcome of critically ill COVID-19 patients and propose a proof-of-concept study for EPO in COVID-19.