

COVID-19 brain: A challenge to medical profession

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As with other neurotropic viruses, viral entry to the brain through the olfactory bulb, the Angiotensin converting enzyme 2 receptor (ACE-2), to which SARS-CoV-2 binds for entry into cells, found in brain vascular endothelium and smooth muscle and SARS-CoV-2 replicates in neuronal cells. It causes oedema, neuronal necrosis and broad gliocyte hyperplasia. The elevated expression of the cytokine, monokine induced by gamma interferon (known as MIG or CXCL9), and with infiltration of monocytes and macrophages plus T cells are consistent with viral CNS entry, triggering the infiltration of immune cells and the release of cytokines and chemokines, which contribute to tissue damage. A vasculitis process similar to that for varicella zoster virus, in which viral replication in the cerebral arterial wall triggers local inflammation, endothelial infection by SARS-CoV-2 and stroke are consistent with a virus-associated microangiopathic process. Competitive blockage of angiotensin-converting enzyme 2 by the SARS-CoV-2 virus down-regulates angiotensin-converting enzyme 2 expression leading to uncontrolled blood pressure and the enhanced possibility of cerebrovascular accidents. The SARS-CoV-2 virus epitopes bear a structural resemblance to several human proteins. Molecular mimicry between virus epitope and myelin basic protein results in autoimmune postinfectious demyelinating syndromes. Spike surface glycoprotein plays a crucial role in immunopathology. Dysregulation of the angiotensin-converting enzyme 2 receptor contributes to the pathogenesis of experimental autoimmune encephalomyelitis. Guillain-Barre syndrome is a frequently encountered neurological complication of COVID-19. Zhao and co-workers described the first patient of Guillain-Barré syndrome in a patient with COVID-19. After this, 18 more patients, of Guillain-Barré syndrome in COVID-19, have been described. Miller Fisher syndrome is a variant of Guillain-Barré syndrome and is characterized by ophthalmoplegia, ataxia and areflexia has also been described in patients with Covid-19. Treatment with intravenous immunoglobulins lead to complete or partial recovery, in the majority. A serine protease enzyme inhibitor blocks viral entry into the host cell. This phenomenon can be exploited for developing a treatment of COVID-19, in the future.

Publications:

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4. Muthiah, R. (2018) Ebstein's Anomaly—An Overview. *Case Reports in Clinical Medicine*, 7, 90-125.
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Biography

Ramachandran Muthiah Consultant Physician & Cardiologist, Zion hospital, Azhagamandapam, Morning Star hospital, Marthandam, Kanyakumari District, India completed M.D. in General Medicine in 1996, D.M. in cardiology in 2003 under Tamil Nadu Dr.MGR Medical University, Chennai, India. He worked as medical officer in Rural Health Services for 5 years and in teaching category as Assistant Professor at Madras Medical College, Coimbatore Medical College, Thoothukudi medical college and Professor at Dr.SMCSI Mission Hospital & Medical College, Karakonam, Trovandrum and Azeezia Medical College, Kollam. He published many papers in *Cardiosource*, *American College of Cardiology Foundation*, *Case Reports in Clinical Medicine (SCIRP)* and *Journal of Saudi Heart Association*. His special research on Rheumatic fever and Endomyocardial fibrosis in tropical belts, Myxomas, Infective endocarditis, apical hypertrophic cardiomyopathy, Ebstein's anomaly, Rheumatic Taussig-Bing Heart, Costello syndrome and Tetralogy of Fallot.