

# CEREBROVASCULAR INJURY, POST-COVID NEUROLOGICAL COMPLICATIONS AND SEIZURE SUSCEPTIBILITY: PATHOPHYSIOLOGICAL MECHANISMS AND CLINICAL IMPLICATIONS

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## ABSTRACT

**Background:** Cerebrovascular diseases are major causes of acquired neurological disability and may contribute to acute symptomatic seizures and the subsequent development of epilepsy. Post-COVID neurological complications have generated additional interest in interactions between cerebrovascular injury, systemic inflammation, hypoxia, and neuronal excitability.

**Objective:** To examine, through a narrative literature review, the mechanisms of seizure susceptibility associated with cerebrovascular injury and post-COVID neurological disorders, focusing on their clinical and diagnostic significance.

**Materials and Methods:** A qualitative analysis of 33 bibliographic publications was conducted, with particular emphasis on studies of ischemic stroke, COVID-19-associated cerebrovascular complications, post-stroke neurological impairment, and rehabilitation. Information was grouped according to neurological pathology, presumed mechanisms of neuronal dysfunction, clinical manifestations, and diagnostic implications.

**Results:** The reviewed literature highlights several mechanisms potentially contributing to seizure development after cerebrovascular injury, including neuronal energy depletion, glutamate-mediated excitotoxicity, ionic imbalance, neuroinflammation, and structural remodeling of cerebral networks. Acute symptomatic seizures and late unprovoked post-stroke seizures have different temporal and pathophysiological characteristics. Post-COVID neurological

complications may involve vascular, inflammatory, hypoxic, and metabolic processes. However, the selected regional studies primarily investigate neurological consequences and rehabilitation rather than directly measuring seizure incidence or long-term epileptic outcomes.

**Discussion:** The findings emphasize the importance of distinguishing acute symptomatic seizures from post-stroke epilepsy and considering multiple etiological factors in patients with a history of COVID-19. A comprehensive diagnostic approach incorporating clinical evaluation, neuroimaging, electroencephalography, and laboratory assessment is necessary.

**Conclusion:** Cerebrovascular injury and postinfectious neurological complications provide important clinical contexts for seizure assessment. Further prospective investigations are required to establish seizure frequency, predictors, and long-term outcomes in these patient populations.

**Keywords:** ischemic stroke; post-stroke epilepsy; COVID-19; cerebrovascular disorders; neuroinflammation; epileptogenesis; seizures; neurological rehabilitation.

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