

# Could cytokine storms lead to brain fog in Lyme disease patients?

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In their article, [published in the journal \*Cancer Cell\*](#),<sup>1</sup> the authors explain, “One of the dozens of unusual symptoms that have emerged in COVID-19 patients is a condition that’s informally called ‘COVID brain’ or ‘brain fog.’ It’s characterized by confusion, headaches, and loss of short-term memory. In severe cases, it can lead to psychosis and even seizures.” Could cytokine storms lead to brain fog in Lyme disease patients?

The authors expected to find evidence of COVID-19 infection in the cerebral spinal fluid (CSF) of 13 patients hospitalized with COVID-19. They did not.

Instead, Remsik and colleagues found an elevation of cytokines in the spinal fluid of their COVID-19 patients with brain fog. According to the authors, “These patients had persistent inflammation and high levels of cytokines in their cerebrospinal fluid, which explained the symptoms they were having.”

**“These increased CSF cytokines are likely the result of both increased blood barrier permeability and local production by cells in the CNS,” the authors write.**

Investigators have previously raised concerns that Lyme disease spirochetes could cross the blood-brain barrier leading to brain fog. [In his article, Dr. Robert Bransfield](#) raised concerns that persisting immune activation causes a cytokine storm in patients with chronic Lyme disease.<sup>2</sup>

Remsik et al. add support to the role of cytokines in patients with brain fog, leading to the question: Are cytokine storms associated with brain fog in Lyme disease patients?

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[Persistent Lyme infection or inflammatory immune response?](#)

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## References:

1. Remsik J, Wilcox JA, Babady NE, et al. Inflammatory Leptomeningeal Cytokines Mediate COVID-19 Neurologic Symptoms in Cancer Patients. *Cancer Cell*. Feb 8 2021;39(2):276-283 e3. doi:10.1016/j.ccell.2021.01.007

2. Bransfield RC. The psychoimmunology of lyme/tick-borne diseases and its association with neuropsychiatric symptoms. *Open Neurol J.* 2012;6:88-93. doi:10.2174/1874205X01206010088

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