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# A Call to Immediate Action to Support Management of Long COVID Related-Symptoms

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From a total of 1.2 million individuals who had symptomatic SARS-Cov-2 infection included in a very nice observational study, Hanson et al.<sup>1</sup> consistently reported the proportion of individuals with predominant Long COVID symptoms: persistent fatigue with bodily pain or mood swings, cognitive problems or ongoing respiratory problems. These findings will undoubtedly contribute to a better characterization and diagnosis of (still poorly defined) Long COVID syndrome, whose polymorphous semiology is often neurological or psychiatric in expression.<sup>2</sup> By extension of those valuable estimates, we call clinicians and researches communities to urgently improve the care of individuals with Long COVID by bolstering the development of therapeutic strategies. While understanding further the mechanisms underlying the persistent symptoms following COVID-19 infection, more multidisciplinary approaches will help advance urgent breakthroughs in the effectiveness of personalized rehabilitative programs.

Faced with the current therapeutic wandering, the solution cannot be no indication at all. The patient is awaiting rehabilitation, regarding its symptoms pattern. Hence, we currently question the place of the noninvasive brain stimulation within the range of therapeutic answers. Practically, the Long COVID symptom clusters<sup>1</sup> may be managed by brain neuromodulation through different pathways<sup>3</sup>: (1) Direct attenuation of infection by stimulating regions involved in the regulation of systemic anti-inflammatory responses and/or autonomic responses and recovery of respiration; (2) Improvement of Long COVID symptoms of bodily pain and chronic fatigue; (3) Improvement of cognitive and physical disorders; (4) Treatment of epidemic-related mental distress, including neurological and psychiatric disorders. For instance, as the

application of transcranial Direct Current Stimulation (tDCS) to the primary cortical motor area modulated the excitability of the respiratory neurological pathways in healthy subjects, the tDCS may alleviate dyspnea in mechanically ventilated COVID patients in ICU care. Likewise, a case report showed the tDCS efficacy (1 daily session; 20 days) on severe anxiety, depression and chronic fatigue in a 53-year-old man with Long COVID symptoms.<sup>4</sup> Other things being equal, these non-invasive neuromodulation treatments are likely not the magic answer, but a promising option for reducing the current (or lack of) supportive and rehabilitation care.

Last but not least, multimodal approaches may provoke synergistic effects and reduce the major Long COVID symptoms. The combination of tDCS and exercise intervention<sup>5</sup> (that resulted in less fatigue, less depression and better functional cognitive status) may improve the needed rehabilitative care, as compared to single-modality interventions. If the multimodal approaches keep receiving convincing evidence,<sup>5</sup> a supplemented therapeutic arsenal will reach more patients.<sup>3</sup> (*Altern Ther Health Med.* 2023;29(3):6).

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