

## A Post-COVID-19 Parkinsonism in the Future?

Now, almost all countries of the world live in conditions of an ongoing viral pandemic attributed to the coronavirus disease 2019 (COVID-19). The contact of humankind with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) will have both immediate and long-term consequences not only for medicine and economics, but also for culture, politics, etc. Given the fact that symptoms of COVID-19 include a/hyposmia and a/hypogeusia, we should consider how this infection will affect the incidence of Parkinson's disease (PD; and/or other neurodegenerative diseases).

I performed a literature review (utilizing PubMed and Google Scholar) focusing on neurological complications of influenza. There are few publications which report on the development of neurological symptoms relating to PD (especially tremor and gait disturbance) within a month after the influenza.<sup>1,2</sup> However, we currently do not have information that the risk of PD development is associated with previous acute viral respiratory infections.<sup>1</sup> But, it is well known that the pathogenesis of PD is extended over time, and it is not possible to accurately determine the first, asymptomatic stage of PD. At this time, the stage-by-stage theory of sporadic PD development made by Heiko Braak and his colleagues is popular. In their theory, the agent penetrates into the nervous system through the nose or gastrointestinal system and results in an abnormal accumulation of the protein, alpha-synuclein, bound to ubiquitin in the damaged cells.<sup>3</sup> So, the development of parkinsonian symptoms after viral respiratory diseases allows us to take a fresh look at the etiology and pathogenesis of PD. It is worth drawing a historical parallel with the postencephalitic lethargica parkinsonism that took place in the 1920s. The cause of the delayed development and progression of parkinsonian symptoms after the acute stage of encephalitis is still unknown.<sup>4</sup>

Regarding PD, it is difficult to prove a causal relationship between influenza in the past and the development of

parkinsonian symptoms because of the large number of years separating these events. It is possible that the development of PD can go according to the theory of "hit and run,"<sup>2,5</sup> as a result of numerous small "hits" (which may include viral respiratory infections) that occur throughout life. It is well known that anosmia and ageusia are common nonmotor features of PD.<sup>6</sup> So, it is possible that the episode of a/hyposmia and a/hypogeusia during the COVID-19 is a small "hit" for the development of parkinsonian symptoms in the future. Perhaps physicians should soon, when examining a patient with suspected PD, clarify the fact of a/hyposmia and a/hypogeusia during the COVID-19 epidemic.

So, to date, there are few publications about symptoms of parkinsonism associated with a pandemic of respiratory viruses. Undoubtedly, additional studies are needed to confirm/refute the trigger effect of SARS-CoV-2 on the neuroinflammatory and degenerative processes leading to the development of parkinsonian symptoms. ●

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