

Abnormal Pupillary Light Reflex Responses in Post-COVID-19 Patients

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Abstract

Purpose: Neurological manifestations involving the central, peripheral, and autonomic nervous system have been reported in the acute phase of coronavirus disease 2019 (COVID-19) and have been shown to persist in a proportion of patients after recovery. In this cross-sectional study, we assessed pupillary light reflex responses using dynamic pupillometry in patients after COVID-19.

Methods: Thirty patients recovered from COVID-19 and 25 healthy control participants were studied using an infrared dynamic pupillometry system (MonPack One; Metrovision, France) to quantify pupillary responses to white light stimulation (light intensity 100 cd/m², on/off time 200/3300 ms) (Figure 1). A questionnaire in accord with the long-COVID guideline developed by the National Institute for Health and Care Excellence (NICE) was used to identify persisting symptoms more than 4 weeks. Patients with diabetes mellitus or any other systemic disease that might cause autonomic dysfunction were excluded.

Results: Post-COVID-19 patients and control participants were matched for age ($P=0.179$) and gender ($P=0.522$). The mean time after the diagnosis of COVID-19 was 3.6 ± 1.6 months. There was no significant difference in the initial pupil diameter, amplitude and velocity of pupil contraction, and latency, duration and velocity of pupil dilation, but the latency of pupil contraction was increased ($P<0.001$) and the duration of pupil contraction was reduced ($P=0.029$) in post-COVID-19 patients compared to healthy controls. Amongst patients with COVID-19, 16/30 (53%) had at least one persisting neurological symptom beyond 4 weeks after infection. Compared to controls, the latency of pupil contraction was increased in both

subgroups of patients with ($P=0.014$) and without ($P<0.001$) persisting neurological symptoms. However, the duration of contraction was reduced only in the subgroup of subjects with neurological symptoms ($P=0.025$). NICE questionnaire score correlated with the duration of contraction ($\rho=-0.366$; $P=0.030$), the latency of dilation ($\rho=-0.411$; $P=0.024$), and the duration of dilation ($\rho=0.381$; $P=0.038$).

Conclusions: Dynamic pupillometry demonstrates significant alterations in pupillary light responses in post-COVID-19 patients, particularly those with persisting neurological symptoms.

This is a 2021 Imaging in the Eye Conference abstract.

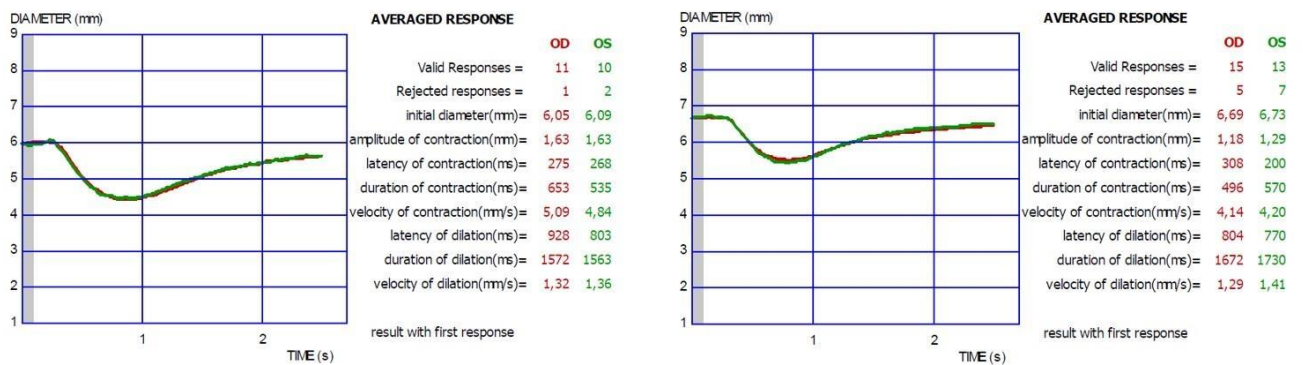


Figure 1. Pupillary light reflex responses measured with dynamic pupillometry in a healthy subject (left), and a post-COVID-19 patient (right).