

Can Transdermal Photobiomodulation Help Us at the Time of COVID-19?

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To the Editor:

WE ARE IN the middle of a pandemic. We need to look for viable paths that can allow us to have safe and noninvasive methods as prophylactic methods or even adjuvants in the treatment of COVID-19. This should be in the eyes of the scientific community and more specifically this is an invitation to photobiomodulation therapy (PBMT) researchers to carry out the randomized clinical trials (RCTs) that lead to the validation or improvement of the proposal that we will present hereunder.

Intravascular laser irradiation of blood is a low-level laser therapy modality that aims to radiate the body's blood flow. This is not a new process. It dates from 1970 in Russia.¹ Although low-intensity laser therapies have been characterized as noninvasive, in the beginning, an optical fiber was introduced into the vascular channel so that the laser radiates all blood return without individually adjusting the dose per patient. This therapy primarily seeks to have a systemic effect. This method allows the benefit of laser light in addition to affecting blood cells and the immune

system reach all the organs of the body and even reduce swallowing at the subclinical level.

Fortunately, the technique evolved. It is no longer invasive when applied to the surface of the radial artery. In some cases, it is suggested to use a wristband that perfectly locates the beam in the radial artery area. However, in practice, we see that with the different tips or handpieces of diode laser equipments that are currently on the market, it is possible to direct the beam, if it is visible (around 600 nm) or invisible (around 800 nm) directly and continuously at wrist level.

Szymczyszyn et al.² called it transdermal low-level laser therapy (LLLT). Currently, the designation of LLLT has been displaced by PBM; if we are going to use this therapy, it would be best to refer to it as transdermal PBM. In that study, they used a wavelength of 808 nm. Researchers considered that each session consisted of a 20 J dose. They found that the laser, applied with its protocol, had a beneficial effect on endothelium and blood flow. Previous studies show that PBM improves the immune system.^{3,4} In consequence, we suggest taking special attention to the superoxide dismutase (SOD) synthesis increment as a result of this therapy and to evaluate if transdermal PBM could control the cytokine storm that may occur in patients with COVID-19.

The irradiation of the blood by the red laser leads to an increase in metabolism and synthesis of SOD, which is a primary enzymatic antioxidant along with catalase and glutathione peroxidase. One of the main functions of this enzyme is to protect cells against mutations through the decline of reactive oxygen species.⁵⁻⁷ Oxidative damage occurs at key biological sites (membrane and mitochondria), threatening its structure and normal functioning. We know that PBM can reach this level using the right dosages.

COVID-19 has made us look again at biology and physiology. That is where the answers can be. It has now been suggested by clinicians and researchers that the virus causes an overreaction of the immune system known as “cytokine storm.”

This term has been associated not only with COVID-19 but to multiple infectious and noninfectious diseases. Pandey and Rizvi⁸ in 2010 made a report relating to cytokine storm with



cytokine storm syndrome. We should keep in mind that acute lung injury is a common consequence of a cytokine storm.¹⁰ The damage caused by the virus could be mitigated with an adjuvant therapy that reaches all organs, logically with a special interest in the respiratory system.

We recommend the identification and treatment of hyperinflammation using a noninvasive therapy that exists with proven safety profiles to address the immediate need to reduce the rising mortality by performing projects that include transdermal PBM with application to 30 min per day for 3–5 days with diode laser whether visible or invisible.

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