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Guest Editorial

Maintaining Photobiomodulation Research During the COVID-19 Pandemic

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Since the declaration of a pandemic by the World Health Organization (WHO) in early 2020, the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and its variants have been ravaging the globe in wave after wave of outbreaks. Photobiomodulation (PBM) researchers and clinicians have witnessed terrible infection and death rates; and the impact on economies, health care, and communities the world over has been devastating. At the time of writing, the Johns Hopkins Coronavirus Resource Centre reports that more than 174 million cases of COVID-19 had been recorded across the world, with more than 3.7 million officially verified deaths (https://coronavirus.jhu.edu/map.html; Accessed June 10, 2021).

COVID-19 vaccination programs began in record time because of enormous investment in scientific discovery, and at the time of writing more than 2.2 billion vaccinations had been administered across the world. Yet there are still enormous difficulties being experienced in numerous hotspots globally. Although large outbreaks occurred initially in metropolitan centers in the developed world, typically, hotspots are now occurring in developing countries where isolation, poverty, politics, government policy, and corruption have resulted in a lack of access to vaccines and difficulties communicating effectively about and adhering to infection control procedures.

Clinical users of PBM have found themselves amid the crises, being deployed to testing and vaccination centers, and to the care of patients diagnosed with COVID-19; and, after acute illness, being challenged by the recovery needs of people with ''long-COVID.''[1] Although the effect of the COVID-19 pandemic on medical research has received some attention[2] the effect on niche fields of research such as PBM has not received the same consideration. It has been gratifying to see that some researchers in the PBM field have been able to pivot successfully into the COVID arena. Examples include Mokmeli and Vetrici[3] and others who wrote about the possible effectiveness of PBM on the cytokine storm and critical care illness brought on by COVID-19. After carrying out proof-of-concept studies in individual cases, Vetrici et al.[4] have now reported on a small controlled study of patients with COVID-19 pneumonia ($n = 10$) demonstrating improved pulmonary performance in participants who received PBM (and preclusion of need for mechanical ventilation) compared with those who did not. These are the PBM research successes in the current pandemic. What of those whose research has been affected by significant outbreaks of the virus, surges in infections and hospitalizations, and enforced lockdowns?

For ourselves, after receiving a small amount of funding to support clinical research, and after protracted discussions and applications for ethical and governance clearances, we had begun a hospital-based study in January 2020 of PBM in women experiencing postnatal nipple pain and trauma. It became clear within weeks of the initial WHO pandemic declaration that there would be changes in the postnatal care of women in our target population. By September 2020, our study was terminated as it became obvious that we would be unable to continue due to the health service changes affecting the recruitment pool—women were electing to leave hospital soon after the birth of their babies due to fear of COVID-19 and the restrictions being placed on hospital visitors. Since then, we have been able to pivot to a recruitment pool based in a community health care setting instead; and where social distancing and infection control procedures can be effectively managed but where participants and their babies feel safer, not at risk of contracting disease. In our experience, human research ethics committees are willing to support the pivot to such research where it is not viable to conduct the work within the acute care setting, and where ethical considerations remain robust.

Our experience raises the likelihood that other researchers in the PBM field will also have experienced delays and perhaps cessation of their programs of research. For example, a great deal of PBM research has emanated from Brazil yet it suffers significantly from the pandemic. It is not possible for researchers to carry out clinical research with human participants or animals when working from home. We must find different ways to undertake our research. One way is to increase efforts at investigating home-based PBM.[5]

In a systematic review of literature regarding home use of PBM devices, Gavish and Houreld[6] found that the devices appeared to mediate effective and safe treatment across a range of conditions. They concluded that ''evaluation of their efficacy requires additional, randomized controlled studies.'' Subsequently, Haze et al.[7] reported a randomized sham-controlled study of ''over-the-counter,'' consumer

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PBM in the homes of participants with diagnosed diabetes mellitus and active chronic foot ulcer. The interventions were applied by a third-party nursing service. Herein then is an example of how to maintain PBM research in the age of pandemics. Of course, circumstances may be different in countries where regulatory standards may restrict the sale and use of PBM devices incorporating laser diodes to health professionals and in supervised practice settings only. Devices exclusively with light-emitting diodes or with Class 1 or 2 laser diodes may be a solution in such cases. We are now working toward implementing self-administered PBM with a home-use device in people undergoing chemoradiotherapy for hemopoietic cancers and who are at risk of oral mucositis.

It will be edifying to see if the current pandemic results in greater use of PBM in home-based settings; and whether the usage parameters and outcomes evolve as a result. The investigation and treatment of long-COVID using PBM also presents itself as an opportunity.

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