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Letter to the Editor

The timeliness of ozone in the COVID era

Dear Editor,

we would like to raise awareness on the coronavirus disease (COVID-19) outbreak that is spreading world-wide and represents an international sanitary emergency[1]. Our concern regards the feasibility of a safe return to dental offices without adopting appropriate measures in advance.

In dental settings, the pathogens can be transmitted through inhalation of airborne microorganisms that can remain suspended in the air for long periods or through direct contact with fluids or other patient materials, contact of mucosae with infected aerosol propelled at short distance by coughing and talking without a mask, and indirect contact with contaminated instruments and/or environmental surfaces[2,3].

The results of a recent study[4] indicate that aerosol and fomite transmission of SARS-CoV-2 is plausible, since the virus can remain viable and infectious in aerosols for hours and on surfaces up to days. These findings provide enough information for pandemic mitigation efforts.

That said, it would be convenient that the scientific dental community could came up with a solution for the upcoming future, preventing erratic conducts from the majority of us.

As instructed by the Guideline for the Diagnosis and Treatment of Novel Coronavirus Pneumonia (the 5th edition) released by the National Health Commission of the People's Republic of China, 2019-nCoV is vulnerable to oxidation. Among oxidant agents, ozone is the third strongest. Ozone is a natural gas and it can be easily produced from pure oxygen via an endothermic process allowed by high voltage gradients[5]. To reduce infection risk from virus-containing aerosols, there are many techniques, including filtration, ultraviolet germicidal irradiation (UVGI), and ozone. Among these methods, ozone is known in decreasing the viral load and used as a potent oxidizing agent in food and other industries. Viruses may be inactivated by ozone acting on the protein structure of the capsid, on the nucleic acids[6].

Tseng and Li[6] explored different concentration of ozone with regards to virus inactivation. They found that ozone concentration ranging from 1-10 ppm were needed to reach 99% virus inactivation for exposure times of few seconds. None of the virus tested was a coronavirus, which we already know to be more susceptible to ozonization. In fact, despite high ozone doses are needed to kill viruses (toxic for the human respiratory system), it has been suggested that prolonged exposure (30 minutes) to low doses (0.04 ppm) could inactivate aerosolized viruses, those concentration being totally compatible with human physiology[7].

The idea of implementing the use of semi-continuative gaseous ozone environmental dispensers, between patients and night-time full ozonization, and the transversal application of ozonized water for dental units and hand-pieces appears to us totally plausible. Furthermore, the clinical application of medical ozone in dentistry is growing at a staggering pace with promising results[8,9].

Conventional wisdom states that we should wait for evidence-based information before starting an enterprise this big in the medical field. Still, we cannot afford the luxury of appealing to time, as we do not have it. As usual, we need to adjust the effect of ozone for the value of time. If we embrace ozone now, its value would be the greatest in terms of both mitigation of pandemics and of adherence to prevention clinical protocols.

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Conflict of Interest

The Authors declare that they have no conflict of interests.

References

1) Zhu N, Zhang D, Wang W, Li X, Yang B, Song J, Zhao X, Huang B, Shi W, Lu R, Niu P, Zhan F, Ma X, Wang D, Xu W, Wu G, Gao GF, Tan W; China Novel Coronavirus Investigating and Research Team. A novel coronavirus from patients with pneumonia in China. N Engl J. Med 2020; 382: 727-733.
2) Lu CW, Liu XF, Jia ZF. 2019-nCoV transmission through the ocular surface must not be ignored. Lancet 2020; 395: e39.
3) Peng X, Xu X, Li Y, Cheng L, Zhou X, Ren B. Transmission routes of 2019-nCoV and controls in dental practice. Int J Oral Sci 2020; 12: 9.
4) van Doremalen N, Bushmaker T, Morris DH, Holbrook MG, Gamble A, Williamson BN, Tamin A, Harcourt JL, Thornburg NJ, Gerber SI, Lloyd-Smith JO, de Wit E, Munster VJ. Aerosol and surface stability of SARS-CoV-2 as compared with SARS-CoV-1. N Engl J Med 2020; 382: 1564-1567.
5) Bocci, V. Ozone. A new medical drug, 2005. ISBN 1-4020-3139-4 (HB).
6) Tseng CC, Li CS. Ozone for inactivation of aerosolized bacteriophages. Aerosol Sci Tech 2006; 40: 683-689.
7) de Mik G, de Groot I. Mechanisms of inactivation of bacteriophage phiX174 and its DNA in aerosols by ozone and ozonized cyclohexene. J Hyg (Lond) 1977; 78: 199-211.
8) Gandhi KK, Cappetta EG, Pavaskar R. Effectiveness of the adjunctive use of ozone and chlorhexidine in patients with chronic periodontitis. BDJ Open 2019; 5: 17.
9) Marconcini S, Giammarinaro E, Cosola S, Genovesi AM, Covani U. Mandibular osteonecrosis associated with antacid therapy (esomeprazole). Eur J Case Rep Intern Med 2019; 6: 001279.

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