COVID-19: Ozone Proved to Be Highly Efficient in Effective in Disinfecting Coronavirus

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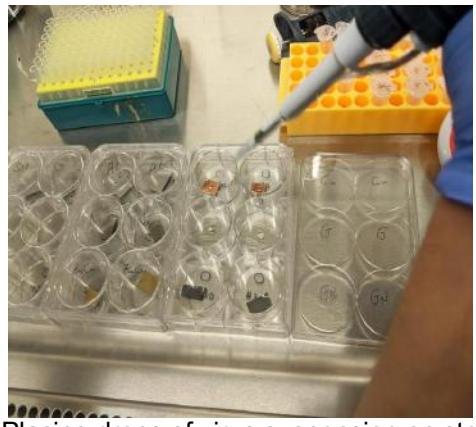

Placing drops of virus suspension on sterile surfaces prior to ozone exposure

Studies have shown that SARS-CoV-2 remains active on aerosols and surfaces for between several hours and several days, depending on the nature of the surface and environmental conditions.

Presently, researchers from Tel Aviv University have demonstrated that ozone, which has already long been used as an antibacterial and antiviral agent in water treatment, effectively sanitizes surfaces against Coronavirus after short exposure to low concentrations of ozone.

The research team was led by Dr. Ines Zucker from the School of Mechanical Engineering at the Ivy and Eldar Fleischman Faculty of Engineering and the Porter School of the Environment and Earth Sciences at the Tel Aviv University. Dr. Zucker collaborated with Dr. Moshe Dessau from the Azrieli Faculty of Medicine at Bar Ilan University in the Galilee and Dr. Yaal Lester from the Azrieli College in Jerusalem in order to investigate the feasibility of ozone for indoor inactivation of SARSCoV-2.

The preliminary findings of the study were published in the Journal: Environmental Chemistry Letters (Abstract below)

Reference:

"Pseudoviruses for the assessment of coronavirus disinfection by ozone" by Ines Zucker, Yaal Lester, Joel Alter, Michal Werbner, Yinon Yecheskel, Meital Gal-Tanamy and Moshe Dessau, 13 January 2021, Environmental Chemistry Letters.

Abstract:

The COVID-19 pandemic has severely impacted public health worldwide. Evidence of SARS-CoV-2 transmission via aerosols and surfaces has highlighted the need for efficient indoor disinfection methods. For instance, the use of ozone gas as a safe and potent disinfectant against SARS-CoV-2 virus is of particular interest. Here we tested the use of pseudoviruses as a model for evaluating ozone disinfection of the coronavirus at ozone concentrations of 30, 100, and 1000 ppmv.

Results show that ozone disinfection rate of pseudoviruses was similar to that of coronavirus 229E (HuCoV-229E) at short contact times, below 30 min. Viral infection decreased by 95% following ozone exposure for 20 min at 1000 ppmv, 30 min at 100 ppmv and about 40 min at 30 ppmv.

This findings mean that ozone is a powerful disinfectant toward the enveloped pseudovirus even at low ozone exposure. We also showed that viral disinfection occurs on various contaminated surfaces, with a positive association between disinfection and surface hydrophilicity. Infected surfaces made of aluminum alloy, for example, were better disinfected with ozone as compared to brass, copper, and nickel surfaces. Lastly, we demonstrate the advantage of ozone over liquid disinfectants by showing similar viral disinfection on top, side, bottom, and interior surfaces. Overall, our study demonstrates the potential use of ozone gas disinfection to combat the COVID-19 outbreak.

Link to entire white paper: ***DOI: 10.1007/s10311-020-01160-0***

Most people recognize ozone as a thin layer of the Earth's atmosphere that guards us against the harmful effects of UV radiation. However, ozone is also known as a strong oxidant and disinfectant employed in water and wastewater treatment schemes. Within the study framework, the research team decided to adapt the mechanisms whereby they use ozone to break down organic pollutants from contaminated waters and demonstrate the expected efficacy of the ozone in neutralizing Coronavirus.

Ozone gas is generated by electrical discharge (the breakdown of chemical compounds into their elements using electric current), in the course of which oxygen molecules are reconstructed in the form of ozone molecules. In the course of their study, the researchers demonstrated the inactivation from various infected surfaces, even in hard-to-reach locations.

They demonstrated a high level of disinfection within minutes, even on surfaces not typically disinfected with manually-applied liquid disinfectants with a statistical success rate of above 90%. According to Dr. Ines Zucker, the method involves inexpensive and readily available technology, which can be utilized to disinfect hospitals, schools, hotels, and even aircraft and entertainment halls.

"Gaseous ozone is generated from oxygen gas by electrical discharge. Now, for the first time, we have managed to prove that it is highly efficient in combating Coronavirus as well," stresses Dr. Zucker. "Its advantage over common disinfectants (such as alcohol and bleach) is its ability to disinfect objects and aerosols within a room, and not just exposed surfaces, rapidly and with no danger to public health." Dr. Zucker estimates that, since the gas can be produced relatively cheaply and easily, it should be possible to introduce ozone disinfecting systems on an industrial scale to combat the COVID-19 outbreak.