Concise Communication

Continuously active disinfectant inactivates severe acute respiratory coronavirus virus 2 (SARS-CoV-2) and human coronavirus 229E two days after the disinfectant was applied and following wear exposures

William A. Rutala PhD, MPH1, Luisa A. Ikner PhD2, Curtis J. Donskey MD3, David J. Weber MD, MPH1-4 and Charles P. Gerba PhD2

1Division of Infectious Diseases, University of North Carolina School of Medicine, Chapel Hill, North Carolina, 2Department of Environmental Science, University of Arizona, Tucson, Arizona, 3Infectious Disease Section, Cleveland VA Medical Center, Cleveland, Ohio and 4Hospital Epidemiology, University of North Carolina Medical Center, Chapel Hill, North Carolina

Abstract

The surface environment in rooms of coronavirus disease 2019 (COVID-19) patients may be persistently contaminated despite disinfection. A continuously active disinfectant demonstrated excellent sustained antiviral activity following a 48-hour period of wear and abrasion exposures with reinoculations. Reductions of >4-log10 were achieved within a 1-minute contact time for severe acute respiratory coronavirus virus 2 (SARS-CoV-2) and the human coronavirus, 229E.

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>99.9% following a 1-minute contact time. All viral preparations were prepared with fetal bovine serum to achieve a 5% organic soil load. Carriers were neutralized using 1 mL Letheen broth base (Neogen, Lansing, MI) followed by immediate passage through a Sephadex G-10 gel filter column via centrifugation (3,500 × g for 5 minutes).

Human coronavirus 229E (ATCC VR-740), an enveloped respiratory virus, was procured from the American Type Culture Collection (ATCC, Manassas, VA). Propagation and assay of HCoV-229E was performed using the human lung fibroblast MRC-5 cell line (ATCC CCL-171). The SARS-CoV-2 isolate USA-WA1/2020 was deposited by the Centers for Disease Control and Prevention and was obtained through BEI Resources, the National Institute of Allergy and Infectious Diseases, and the National Institutes of Health. SARS-CoV-2 (BEI NR-52281) was propagated and assayed using the Vero E6 cell line (ATCC CRL-1586). HCoV-229E and SARS-CoV-2 viral stocks were enumerated on their respective host cell lines seeded into 96-well cell culture trays using the TCID50 technique.

The continuously active disinfectant is EPA-registered as Firebird F130 (Microban Products, Huntsville, NC) and is marketed as Sani-24 by Professional Disposable International (Woodcliff Lake, NJ). The product has a disinfectant claim against 32 microorganisms and a residual claim against 5 bacteria.

### Results and Discussion

The continuously active disinfectant studied demonstrated excellent sustained antiviral activity (>4.0-log10 reduction) within 1 minute against human coronavirus 229E and SARS-CoV-2 prepared with 5% organic soil following a 48-hour period of wear and abrasion exposures (Table 1). We detected no reduction in viral titer for the control.

Environmental contamination plays an important role in the transmission of several key healthcare-associated pathogens, including MRSA, VRE, and MDROs. Evidence in the literature supporting the role of the contaminated surface environment in the transmission of healthcare pathogens has been published.6 Many of the studies demonstrated that rooms are not adequately cleaned or disinfected, and patients admitted to a room previously occupied by a patient colonized or infected with a pathogen (eg, MRSA, VRE, Clostridoides difficile) have an increased likelihood of developing colonization or infection with that pathogen.7 To minimize this risk, improved terminal room decontamination (eg, supplemental ultraviolet disinfection following cleaning and disinfection) of contact precaution patient rooms has led to a decreased rate of infection in patients subsequently admitted to the room where the prior occupant was colonized or infected.8 However, the limitation of these "no touch" technologies is that currently they can only be used for terminal room disinfection (ie, not daily cleaning and disinfection) because they require removal of the patients, visitors, and healthcare personnel from the room.

Because routine cleaning and disinfection of room surfaces by environmental services is frequently inadequate and surfaces rapidly become recontaminated by patients, visitors, and staff, continuous room decontamination methods are being evaluated.10 These findings highlight the potential to interrupt transmission from contaminated surfaces via healthcare provider’s hands by suboptimal compliance with hand hygiene or inappropriate glove use.

A continuously active disinfectant is a continuous room decontamination method.10 That is, if an antimicrobial residue was left on a disinfected surface and it persists on the surface for ≥24 hours, it could reduce or eliminate the problem of continuous recontamination and minimize the role of environmental surfaces as reservoirs of pathogens by eliminating them on the treated surface. The intent of this technology is to make surfaces hygienically clean (not sterile), or free of pathogens in sufficient numbers to prevent human disease. In this study, we subjected a continuously active disinfectant to wear and abrasion exposures over 48 hours to assess residual antiviral efficacy against SARS-CoV-2 and HCoV-229E on surfaces for ≥24 hours.

Previous studies demonstrated persistent antimicrobial activity (ie, 3–5-log10 reduction) 24 hours after application for many healthcare pathogens within a contact time of 5 minutes.3,4 In this study, we have demonstrated residual efficacy of the continuously active disinfectant to inactivate SARS-CoV-2 and HCoV-229E within 1 minute following 12 cycles of alternating dry and wet abrasions (6 dry and 6 wet) performed with reinoculations during the 48 hours after the product application. Based on our data using SARS-CoV-2 as well as studies with several common healthcare pathogens (eg, MRSA, VRE), continuously active disinfectants can significantly reduce bacterial, viral, and yeast populations that contact treated surfaces within 1–5 minutes over ≥24 hours.3,4 If the microbial load on surfaces is pathogen free or pathogens are significantly reduced, the treated environmental surface will not act as a reservoir or source for pathogens (including SARS-CoV-2) linked to disease transmission.

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### Conflicts of interest

Drs Rutala and Weber are consultants to Professional Disposables International (PDI). Dr Donskey has received research funding from Clorox and PDI.

### References


