Bacteriophages as Surrogate Marker for Inactivation of SARS-CoV-2 by Ultraviolet Radiation to Prevent COVID-19 Transmission

Sir,

Severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), the etiological agent of COVID-19 transmits through aerosols, body fluid or by the fomites present around the infected individuals.[1] The ultraviolet (UV) radiation may be effectively used to limit the transmission of COVID-19. However, it must be maintained and monitored regularly to provide sufficient lethal dose. The bacteriophages may be used as indicator to monitor the lethal intensity of UV source for viruses.

In the present study, *Acinetobacter* phage AIIMS-Ab6 [Figure 1a] active against multidrug-resistant *Acinetobacter baumannii* and *Staphylococcus* phage BHU-22, active against methicillin-resistant *Staphylococcus aureus* were used. These phages (10⁶ plaque-forming units/ml) were exposed to UV of 254 wavelength, 400 mW/m² intensity for 0, 5, 10, and 15 min and spotted on their respective bacterial lawn, and incubated overnight at 37°C to observe the lytic zones. The AIIMS-Ab6 and BHU-22 phages showed inactivation on 10 min and 5 min of UV exposure, respectively [Figure 1b and c].

The UV radiation does not produce any physical or chemical damage to the objects.[2] The combined UVA and UVC exposure completely inactivated the SARS-CoV-2 viral stock,[3] and UV light was also found suitable to disinfect the high touch area of the hospital surfaces.[4]

Therefore, we conclude that UV radiation is an effective mean to deactivate the model viruses; bacteriophage and strongly propose to apply the UV radiation of 254 wavelength,

![Figure 1:](image-url) (a) The *Acinetobacter* phage AIIMS-Ab6. (b) Multidrug-resistant *Acinetobacter baumannii* bacterial lawn showing inactivation of phage on 10 and 15 min of ultraviolet exposure. (c) Methicillin-resistant *Staphylococcus aureus* bacterial lawn showing no lysis by bacteriophage after 5, 10, and 15 min of ultraviolet exposure.
400 mW/m² intensity for 15 min, as disinfectant over COVID-19 exposed surfaces, hospital records, equipment, reusable personal protective equipment, handheld devices, and mobile phones to reduce the transmission of this deadly disease and to use the bacteriophages as surrogate marker to monitor the effective UV dose.

Research Quality and Ethics Statement
The authors followed applicable EQUATOR Network (http://www.equator-network.org/) guidelines, notably the CARE guideline, during the conduct of this report.

Acknowledgment
The authors are thankful to Dr. Gopal Nath, Professor and Head, Department of Microbiology, Institute of Medical Sciences, Banaras Hindu University, Varanasi.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

Rathor Nisha, Chaudhry Rama
Department of Microbiology, All India Institute of Medical Sciences,
New Delhi, India

Address for correspondence: Dr. Chaudhry Rama,
Department of Microbiology, All India Institute of Medical Sciences,
New Delhi, India.
E-mail: drramach@gmail.com

REFERENCES
1. World Health Organization (WHO). Modes of Transmission of Virus Causing COVID-19: Implications for IPC Precaution Recommendations. 2020. Available from: https://www.who.int/news-room/commentaries/detail/modes-of-transmission-of-virus-causing-covid-19-implications-for-ipc-precaution-recommendations. Accessed on 02 August 2021.
2. Reed NG. The history of ultraviolet germicidal irradiation for air disinfection. Public Health Rep 2010;125:15-27.
3. Heilingloh CS, Aufderhorst UW, Schipper L, Dittmer U, Witzke O, Yang D, et al. Susceptibility of SARS-CoV-2 to UV irradiation. Am J Infect Control 2020;48:1273-5.
4. Casini B, Tuvo B, Cristina ML, Spagnolo AM, Totaro M, Baggiani A, et al. Evaluation of an Ultraviolet C (UVC) light-emitting device for disinfection of high touch surfaces in hospital critical areas. Int J Environ Res Public Health 2019;16:E3572.

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

How to cite this article: Nisha R, Rama C. Bacteriophages as surrogate marker for inactivation of SARS-CoV-2 by ultraviolet radiation to prevent COVID-19 transmission. J Global Infect Dis 2021;13:199-200.

Received: 11 August 2021 Revised: 18 August 2021 Accepted: 06 September 2021 Published: 23 November 2021

© 2021 Journal of Global Infectious Diseases | Published by Wolters Kluwer - Medknow