The importance of the minimum dosage necessary for UVC decontamination of N95 respirators during the COVID-19 pandemic

Shanthi Narla  
*Henry Ford Health System*, snarla1@hfhs.org

Alexis B. Lyons  
*Henry Ford Health System*, ALyons5@hfhs.org

Indermeet Kohli  
*Henry Ford Health System*, ikohli1@hfhs.org

Angeli E. Torres  
*Henry Ford Health System*, atorres5@hfhs.org

Angie Parks-Miller  
*Henry Ford Health System*, AMILLER5@hfhs.org

*See next page for additional authors*

Follow this and additional works at: [https://scholarlycommons.henryford.com/dermatology_articles](https://scholarlycommons.henryford.com/dermatology_articles)

**Recommended Citation**


This Article is brought to you for free and open access by the Dermatology at Henry Ford Health System Scholarly Commons. It has been accepted for inclusion in Dermatology Articles by an authorized administrator of Henry Ford Health System Scholarly Commons.
Authors
Shanthi Narla, Alexis B. Lyons, Indermeet Kohli, Angeli E. Torres, Angie Parks-Miller, David M. Ozog, Iltefat H. Hamzavi, and Henry W. Lim

This article is available at Henry Ford Health System Scholarly Commons: https://scholarlycommons.henryford.com/dermatology_articles/427
LETTER TO THE EDITOR

The importance of the minimum dosage necessary for UVC decontamination of N95 respirators during the COVID-19 pandemic

To the Editor,

The World Health Organization (WHO) recently released a press report highlighting the severe shortage of personal protective equipment (PPE) that is endangering healthcare workers worldwide during the COVID-19 pandemic.1 To meet this urgent need, healthcare institutions across the world have begun to utilize the germicidal properties of ultraviolet C (UVC) to decontaminate N95 respirators so that they can be reused.2 It is clearly crucial that the dose of UVC delivered is sufficient to kill any viable SARS-CoV-2, the causative virus of the COVID-19 pandemic that may be present on the respirators.

Currently, there is a significant amount of variability in the UVC dosages used to decontaminate N95 respirators.3,4 While no published data are available on the UVC dose needed to decontaminate respirators from SARS-CoV-2, other coronaviruses such as severe acute respiratory syndrome coronavirus (SARS-CoV) and Middle East respiratory syndrome coronavirus (MERS-CoV)5 could potentially serve as surrogate markers. Heimbuch et al evaluated the doses of UVC needed to decontaminate circular coupons prepared from 3M 1870 N95 filtering facepiece respirators (FFRs) using a variety of viruses including influenza A (H1N1), avian influenza A virus (H5N1), influenza A (H7N9) A/Anhui/1/2013, influenza A (H7N9) A/Shanghai/1/2013, MERS-CoV, and SARS-CoV. There was no detectable viable virus for all six strains after UVC decontamination using 1 J/cm².6 This dose is now reflected in the Centers for Disease Control and Prevention (CDC)7 and N95Decon’s websites.8

However, it is important to note that in the above study, the viruses were only tested on circular coupons from one type of N95 respirator. As Mills et al9 and Heimbuch et al6 further illustrated in their studies, the 1 J/cm² dose may not be adequate to kill the tested viruses depending on the material/type of respirator used. Mills et al found that only facepieces on 12 of 15 models and straps on 7 of 15 models showed a significant (≥3 log) reduction of H1N1 influenza viability. Similarly, Heimbuch et al found that only facepieces on 11 of 15 models and straps on 4 of 15 models showed a significant (≥3 log) reduction of H1N1 influenza viability. In addition, there were differences in many cases between whether mucin or sebum was used as an artificial soiling agent, highlighting the importance of making sure that no shadowing (when materials such as cosmetics or sunscreens are deposited on the respirators) occurs because this can block UVC penetration and hinder UVC decontamination.6,8

During this crisis, there is a myriad of UVC devices being discussed for possible use in health care settings which have variable output and design. There is the urgent need to raise awareness that at least 1 J/cm² is used to all surfaces for UVC decontamination methods to ensure that we are not endangering our healthcare workers. It should also be emphasized that there are significant limitations to UVC decontamination methods due to the variety of respirators used in healthcare facilities. Consequently, this process should only be considered as a risk mitigation effort during severe shortage of N95 respirators but is one of the most effective and best studied options available to front-line personnel.

KEYWORDS
coronaviruses, COVID-19, dosage, filtering facepiece respirators, N95, pandemic, reuse, risk mitigation, SARS-CoV-2, ultraviolet C

CONFLICTS OF INTEREST
DO is an investigator for Biofrontera. ABL and SN are sub-investigators for Biofrontera. IK, APM, and AET have no relevant disclosures. HWL is an investigator for LITE study which is funded by PCORI, and home phototherapy machines are provided by Daavlin, and has participated as a speaker in general educational session for Ra Medical System. IHH is an investigator for LITE study which is funded by PCORI, and home phototherapy machines are provided by Daavlin.

Shanthi Narla1
Alexis B. Lyons1
Indermeet Kohli1,2
Angeli E. Torres1
Angela Parks-Miller1
David M. Ozog1
Iltefat H. Hamzavi1
Henry W. Lim1

1Photomedicine and Photobiology Unit, Department of Dermatology, Henry Ford Hospital, Detroit, MI, USA
2Department of Physics & Astronomy, Wayne State University, Detroit, MI, USA
LETTER TO THE EDITOR

Correspondence
Henry W. Lim, MD, Department of Dermatology, Henry Ford Medical Center New Center One, 3031 W. Grand Blvd Suite 800, Detroit, MI 48202, USA
Email: hlim1@hfhs.org

ORCID
Shanthi Narla https://orcid.org/0000-0003-0228-3262
Alexis B. Lyons https://orcid.org/0000-0003-0799-5680
Indermeet Kohli https://orcid.org/0000-0002-2316-6375
Angeli E. Torres https://orcid.org/0000-0002-9551-2118
Angela Parks-Miller https://orcid.org/0000-0001-5605-5842
Iltefat H. Hamzavi https://orcid.org/0000-0002-3137-5601
Henry W. Lim https://orcid.org/0000-0002-1576-1115

REFERENCES