FUJITA HEALTH UNIVERSITY

COVID-19 Live Strain Antimicrobial Effectiveness Test

Performed by

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FUJITA HEALTH UNIVERSITY

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In Industry Cooperation with

Fujidenolo Co., LTD,

Diversey Incorporated

Daylight Medical Corporation

STUDY TITLE

Evaluation of the Antiviral Activity of an UV-C Device, MoonBeam3, against SARS-CoV-2

Test Organism:

Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), obtained from Kanagawa Prefectural Institute of Public Health, Japan;

(SARS-CoV-2/Hu/DP/Kng/19-020)

PRODUCT IDENTITY

MoonBeam3 UV-C 254nm Disinfection Technology

AUTHOR

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STUDY COMPLETION DATE

September 4, 2020

PERFORMING LABORATORY

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GENERAL INFORMATION

Study Title: Evaluation of the Antiviral Activity of an UV-C Device, MoonBeam3, against SARS-CoV-2

Project Number: FDDIDLM-82020

TRF Number: COVID-19-MB3-2020

TEST SUBSTANCE IDENTITY

Test Device Name: MoonBeam3 254nm UVC Device

STUDY DATES

Date Sample Received: August 19, 2020

Study Initiation Date: August 24, 2020

Experimental Start Date: August 24, 2020

Experimental End Date: September 5, 2020

Study Completion Date: September 15, 2020

Test Organism

Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), obtained from Kanagawa Prefectural Institute of Public Health, Japan;

(SARS-CoV-2/Hu/DP/Kng/19-020)

Grown and titrated using Vero/E6-TMPRSS2 cells (obtained from Japanese Collection of Research Bioresources Cell Bank (JCRB))

Exposure Times:

For safety purposes, UVC Emitter (within a secured BSC biologic hazard /safety cabinet)

Exposure Temperature: Air-conditioned (22.0 dg C., with 55% humidity)

Carriers Tested: 3 tests for each exposure with controls

Cell Culture Medium: Dulbecco's Modified Eagle's Medium, supplemented with fetal bovine serum

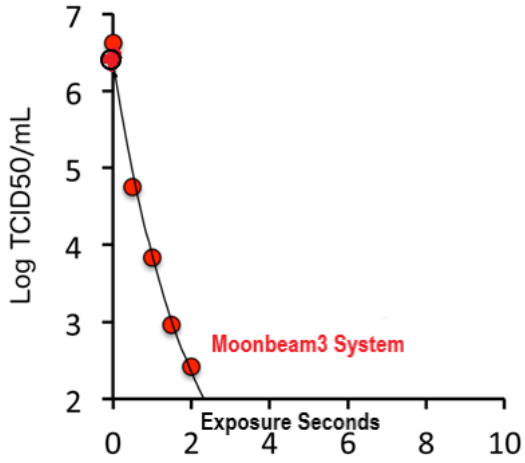
EXPERIMENTAL DESIGN

SARS-CoV-2 virus fluid (10 μl) inoculum was placed onto the surface of stainless carriers. The carriers were air-dried and then exposed to the UV device for the applicable exposure time. See Table for exact testing conditions. After exposure, the virus on the carrier was collected by suspending in cell culture medium and assayed for survivors.

Notes on Exposure time control: Accounting for UVC Bulb optimal emission (~1-1.5 second warming time), exposures were started after warming in controlled 0, 0.5, 1.0, 2.0, 3.0 and 4.0 second precision. Exposures were made until ND (no detectable virus levels were achieved, > log 6 reduction, 99.9999%).

TABLE 1: TEST RESULTS_SARS-COV-2

Test Organism: SARS-CoV-2						
Test Application: MoonBeam3 254nm System Single emitter						
Exposure Time	Carrier #	TCID50/mL	Log_{10}	Average Log_{10}	Geometric Mean	Percent and Log_{10} Reduction
0 sec	1	$3.16x10^6$	6.50	6.63	$4.33x10^6$	0.00%
	2	$5.62x10^6$	6.75			0.00 log_{10}
	3	$4.22x10^6$	6.625			
0.5 sec	1	$7.50x10^4$	4.875	4.75	$5.78x10^4$	98.7%
	2	$4.22x10^4$	4.625			1.88 log_{10}
	3	$5.62x10^4$	4.75			
1.0 sec	1	$5.62x10^3$	3.75	3.83	$7.73x10^3$	99.8%
	2	$1.33x10^4$	4.125			2.79 log_{10}
	3	$4.22x10^3$	3.625			
1.5 sec	1	$1.33x10^3$	3.125	2.96	$9.65x10^2$	99.98%
	2	$1.00x10^3$	3.00			3.67 log_{10}
	3	$5.62x10^2$	2.75			
2.0 sec	1	$1.33x10^2$	2.125	2.42	$2.90x10^2$	99.99%
	2	$3.16x10^2$	2.50			4.21 log_{10}
	3	$4.22x10^2$	2.625			
4.0 sec	1	nd	nd	nd	nd	Nd
	2	nd	nd			~99.9999%
	3	nd	nd			>6.0 log_{10}



ANALYSIS

See Test Result Tables for each application and result.

PREPARED BY:

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Date September 15, 2020