Rating the virucidal activity of the MDU RX™ and IDU™ equipment (supplied by Chrysopoeia S.R.L., Pogliano Milanese, MI)

Note: this is a translation of the original report in Italian.
The original signed report is on file at PYURE.

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We performed a study to evaluate the virucidal environmental activity of MDU RX™ and IDU™ systems (produced by HGI Industries Incorporated, Boynton Beach, Florida, USA and marketed in Italy by Chrysopoeia S.r.l., Pogliano, Milanese).

The technology behind the equipment is a reaction that is generated in an inner chamber where there are UV lamps that emit variable waves. These waves decompose vaporized molecules of water and generate hydroxyls (OH). The hydroxyl groups are able to saturate the treated environment, inactivating viruses, bacteria and mold. The system is therefore particularly suited to the treatment of indoor environments. In addition, with respect to safety, the systems can be used in the presence of people, unlike other sanitizing products that use UV-C.

The study described in this report was performed following the procedure described in the standard EN 17272:20201[1].

Equipment evaluated.

(1) MDU/Rx™ (Mobile Disinfection Unit) has been designed to treat bacterial, virus and mold contamination in spaces up to a maximum of 100 m2 of surface. The product is FDA registered for use in medical facilities, and is also used in veterinary, industrial and hotel environments.

(2) IDU™ (Induct Disinfection Unit) is used to eliminate contaminations (bacteria, viruses, molds), but also odors, volatile organic compounds and allergens. It is designed for continuous use and installation in ducted systems. It is equipped with a selector to use one or two optics.

Microorganisms.

The assessment used the following microorganisms:

- poliovirus 1 (Sabin)
- Murine norovirus
- Adenovirus 5
- Influenza virus H1N12[2]

[1] EN 17272:2020 Chemical disinfectants and antiseptics. Methods of airborne room disinfection by automated processes.

[2] Burioni R. et al. Virology, 2010

Suspensions of viral stock were set for the different microorganisms as described in EN 17272:2020, and were titrated (TCID50).

Cellular culture and suspension of viral stock

In the present study the following viruses were used: Adenovirus type 5 (ATCC VR5), Poliovirus 1 (LSC 2ab), Murine norovirus (strain S99)[3], and Influenza virus H1N1. The suspensions stock were obtained by infecting monolayers cell of cells Hela (for adenovirus and poliovirus) or RAW 264.7 (ATCC TIB-71) (for murine norovirus) confluent to 90% and cultured in MEM plus 2% FCS. In the presence of cytopathic effect (CPE) greater than 80%, cells and supernatants were subjected to 3 cycles of freezing-thawing and subsequent centrifugation at a low number of revolutions to discard cellular debris. The viral titer was determined by infecting cells in suspension with 0.1 ml of the suspension viral stock and subsequent evaluation of TCID 50 (Spearman-Karber method[4]).

The titer of the suspension stock and of the depositions for each carrier (controls) are described below in Table 1.

Table 1.

Microorganism Test	Titre Suspension* (T=0)	Titer Control* after 6 Hrs
Influenza H1N1	8.00	6.20
Poliovirus 1 (Sabin)	8.20	6.20
Murine Norovirus	8.47	6.00
Adenovirus 5	8.24	6.00

* Average of 3 tests, Log 10

[3] Friedrich-Loeffler-Institut, Federal Research Institute for Animal Health, Riemser Virusbank (RVB), Collection of Animal Pathogenic Viruses

[4] The titer viral is calculated using the following formula: logarithm negative of the 50% end-point = log negative of the highest concentration of virus used - [(sum of percentages infected at each dilution / 100-0.5) x (logarithm of dilutions)]

Preparation Test

Viral suspensions were used to contaminate steel supports. The initial viral concentration deposited was such as to enable to show a 4 log reduction.

Experimental Conditions

Interfering substance: clean conditions (BSA 0.3 g/l), dirty conditions (BSA 3.0 g/l).

Deposit: 50 ul of suspension stock

Drying: 21 ° C in hood a flow laminar

Positioning of the carrier: 1.0 - 1.5 meter from the floor, the same distance from the disinfection source.

Test Chamber: 30 m3

Duration of exposure: measurements at 1hour and 6 hours

Test Results

The MDU/RX™ results are shown in Table 2 (average of 3 triplicate runs) after 1 hour and 6 hours of treatment. The decrease for each time point is indicated in brackets.

Table 2 MDU/RX™ Results

Virus Tested	Clean 1 hour	Dirty 1 hour	Clean 6 hour	Dirty 6 hour	Control 6 hour
Influenza H1N1	4.80 (1,40)	5.00 (1.20)	1.00 (5.20)	1.00 (5.20)	6.20
Poliovirus 1	5.20 (1.00)	5.40 (0.80)	2.00 (4.20)	2.20 (4.00)	6.20
Murine Norovirus	4.80 (1.20)	5.00 (1.00)	1.40 (4.60)	1.80 (4.20)	6.00
Adenovirus 5	5.00 (1.00)	5.40 (0.60)	1.60 (4.40)	2.00 (4.00)	6.00

For the MDU/RX™, a documented reduction of more than 4 Log was observed in the preparations of Influenza virus H1N1, Poliovirus 1, Murine norovirus and adenovirus 5, in both clean and dirty conditions after six hours of incubation.

The IDU™ results are shown in Table 3 (average of 3 triplicate runs) after 1 hour and 6 hours of treatment. The decrease for each time point is indicated in brackets.

Table 3: IDU™ results

Virus Tested	Clean 1 hour	Dirty 1 hour	Clean 6 hour	Dirty 6 hour	Control 6 hour
Influenza H1N1	4.20 (2,00)	4.80 (1.40)	1.10 (5.10)	1.30 (4.90)	6.20
Poliovirus 1	5.00 (1.20)	5.20 (1.00)	2.10 (4.10)	2.20 (4.00)	6.20
Murine Norovirus	4.80 (1.20)	5.00 (1.00)	1.50 (4.50)	1.80 (4.20)	6.00
Adenovirus 5	5.00 (1.00)	5.40 (0.60)	1.70 (4.30)	2.00 (4.00)	6.00

For the IDU™, a documented reduction of more than 4 Log was observed in the preparations of Influenza virus H1N1, Poliovirus 1, Murine norovirus and adenovirus 5, in both clean and dirty conditions after six hours of incubation.

TEST REPORT

EN 17272:2020: Chemical disinfectants and antiseptics. Methods of airborne room disinfection by an automated process.

Laboratory: Laboratory of Microbiology and Virology, University Vita-Health San Raffaele, Milano

Equipment (device): MDU/RX™ and IDU™

Interfering Substance conditions: clean (BSA 0.3 g/L), Dirty (BSA 3.0 g/L).

Type of carrier (plates): stainless steel

Distance between carrier (plates) and the device: 1.0 to 1.5 meter

Volume of the test chamber: 30 m^3

Sampling time points: 1 hour and 6 hours

Conclusion

For the MDU/RX™ and the IDU™, a documented reduction of more than of 4 Log was observed in the preparations with the following viruses: Influenza virus H1N1, Poliovirus 1, Murine norovirus and Adenovirus 5 in clean and dirty conditions after six hours of incubation.

Date: September 11, 2020

Signature