ウイルス除去・除菌装置「ＲｅＳＰＲ（レスパー)」による
アルミニウム表面上の新型コロナウイルス（SARS-CoV-2）の不活化を確認

レカム株式会社（本社：東京都渋谷区、代表取締役社長　伊藤　秀博）が販売を行っているウイルス除去・除菌装置「ＲｅＳＰＲ」につきまして、米国ウィスコンシン大学獣医学部・オソリオ研究所における実証実験の結果、新型コロナウイルスの不活化が確認されましたので、お知らせします。

記

1.「ウイルス除去･除菌装置「ＲｅＳＰＲ」によるアルミニウム表面上の SARS-CoV-2 の不活化を確認)」レポートについて

「ＲｅＳＰＲ」の製造元である ReSPR TECHNOLOGIES INC.（本社：パナマ共和国、プレジデント Christophe Suchy、以下「ReSPR 社」といいます。）は、ウイルス除去・除菌装置「ＲｅＳＰＲ」による新型コロナウイルスの不活化を確認するため、2020 年６月中旬に米国ウィスコンシン大学獣医学部・オソリオ研究所に実証実験を依頼しました。

実証実験は、新型コロナウイルスの不活化を 9 月中旬に確認した後、曝露時間を数パターンで評価を行うなど、実験開始から約５か月間かけて実施されました。米国ウィスコンシン大学獣医学部・オソリオ研究所では、2020 年 12 月８日に添付の当該実証実験レポートを公表、同日に ReSPR 社が受領しております。当社は、ReSPR 社より 11 日に受領いたしました。当社は、ReSPR 社より同社 HP に実証結果を掲載した後に開示することを求められていたことから、本日、お知らせすることとなりました。なお、ウィスコンシン大学は 2020 年６月に発表された東京大学、国立国際医療研究センター、国立感染症研究所のネコ間の呼吸器での新型コロナウイルスでの共同研究にも参画しております。

2．業績等に与える影響について

2021 年９月期連結業績に与える影響については、現在精査中であり、改めて開示の必要が生じた場合には速やかに開示いたします。

以上

（原文）

REPORT:

SARS-CoV-2 inactivation on aluminum surfaces by RESPR HVAC device

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ABSTRACT

Designing effective methods of SARS-CoV-2 inactivation that can be applied in daily human activities can help diminish the transfer and spread of infectious diseases such as COVID-19. RESPR technology has shown to be effective in reducing pathogens and allergens from the air and from surfaces. It is used in devices that release oxidizing

particles to purify the air that people inhale. We tested the SARS-CoV-2 inactivation efficacy of a RESPR HVAC device at different exposure times on aluminum surfaces. A plaque assay was used to measure SARS-CoV-2 titers after 8 different exposure time points (from 10 minutes to 2880 minutes) with the presence of the device. The RESPR HVAC device showed a reduction of 99.991% of the SARS-CoV-2 infectious particles on the aluminum surface after 1440 minutes.

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MATERIALS AND METHODS

Materials infection and sample collection

RESPR HVAC device was placed inside a Biosafety cabinet (BSC) and turned on. Sterile aluminum foil pieces of 24mm x 24mm previously disinfected with 70% ethanol and exposed to UV light for 25 minutes, were individually placed in a petri dish inside the BSC and were kept at room temperature. A 200µl inoculum of 1 x 10^5 PFU of SARS-CoV-2 was placed and extended on each aluminum piece using a micropipette tip. Three replicates were prepared per treatment and enough samples were prepared to evaluate 8 exposure times (15, 30, 60, 120, 360, 720, 1440 and 2880 minutes) (Table 1).

Following each exposure time, 2ml of collection media (DMEM with 2%FBS) was added to each petri dish, making an initial dilution of 1:11, and the aluminum material was washed out by resuspending four to five times using a micropipette; the viral suspension was collected, mixed for homogeneity and aliquoted into 1ml centrifuge tubes. Each collected sample was immediately labeled and stored at -80°C for titration assays.

Table 1. Evaluated treatments

Virus dose	Exposure time (min)	Treatment
$1x10^5$ PFU/200µl	15, 30, 60, 120, 360, 720, 1440 and 2880	RESPR HVAC

Viral-inactivation quantification

The recovered virus suspension was diluted (10-fold, 3 dilutions: 1/10, 1/100, 1/1000) in a mixing plate in duplicate and added to 96 well Vero E6 seeded plates. Plates were incubated for 1 hour at 37°C. Inoculum was discarded and a 2% carboxymethylcellulose overlay was added and incubated for 24 hours at 37°C. Next, the overlay was discarded, plates washed and fixed for 10 minutes at -20°C (using acetone-Methanol solution). Following fixation, plates were washed two times with PBS-T and a primary antibody (IgG Human anti-Coronavirus, 1:2000) was added and incubated overnight at 37°C. The primary antibody was then discarded, and plates were washed twice with PBS-T. A secondary antibody (Goat IgG Anti-Human HRP conjugated, 1:2000) was added and left to incubate for 2 hours at 37°C. After removing the secondary antibody, plates were washed twice with PBS-T and plaques were developed with a Chromogen substrate. Plaques were counted using Immunospot Image analyzer and open-source software Viridot to determine the viral titer. The titer reduction percentage was calculated using the following formula:

$$Percent\ reduction = \frac{(A - B)\ x\ 100}{A}$$

Where: A is the virus titer with no treatment (Control) or the initial titer; and B is the viral titer after treatment.

RESULTS

Viral titers decreased with time as expected, mean values are reported in table 1 and Figure 1; 24 hours after infection (1440 minutes) the titer was reduced up to 45 FFU/mL.

Table 1. Mean titers and standard deviation of SARS-CoV-2 inoculum collected at different time points (from 0 to 2880 minutes) after infection from 24mm x 24mm aluminum foil pieces exposed to a RESPR HVAC device.

Time (m)	Mean (FFU/mL)	DS
0	5060	479.4789
15	3740	396.6106
30	3410	939.8404
60	2456.67	1045.482
120	1246.67	228.9833
360	110.333	127.0171
720	57.67	63.50853
1440	45.333	0
2880	10.67	0

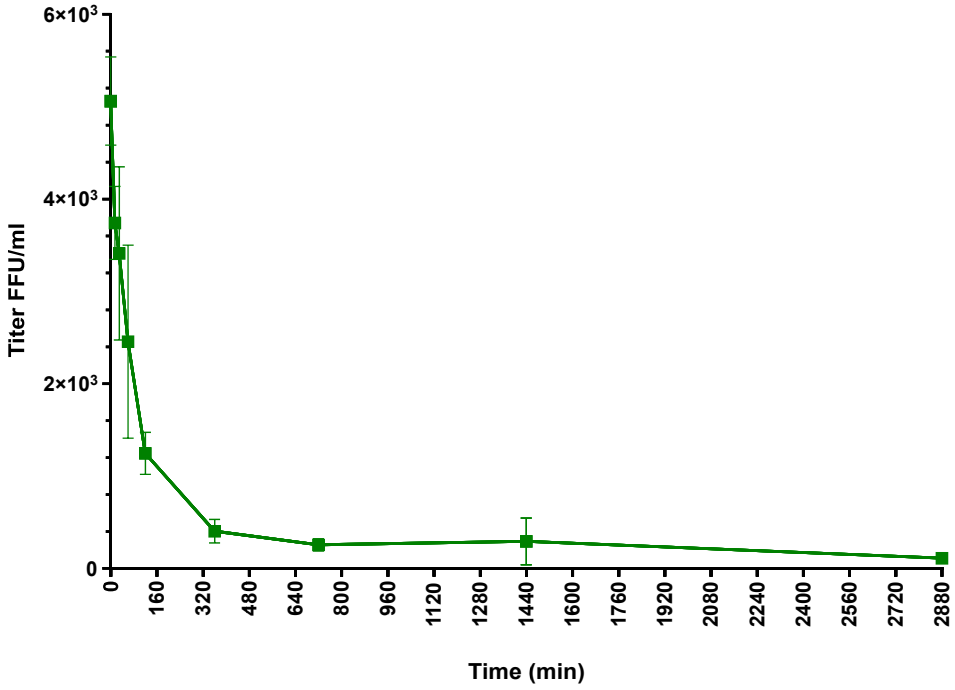

Figure 1. Mean titers and standard deviation of SARS-CoV-2 inoculum collected at different time points (from 0 to 2880 minutes) after infection from 24mm x 24mm aluminum foil pieces exposed to a RESPR HVAC device.

The total reduction of SARS-CoV-2 titer, calculated in relation to the initial inoculum ($\bar{x}$=5.06x10^3 PFU/ml), reached 99.991% after 1440 minutes of exposure (Figure 3).

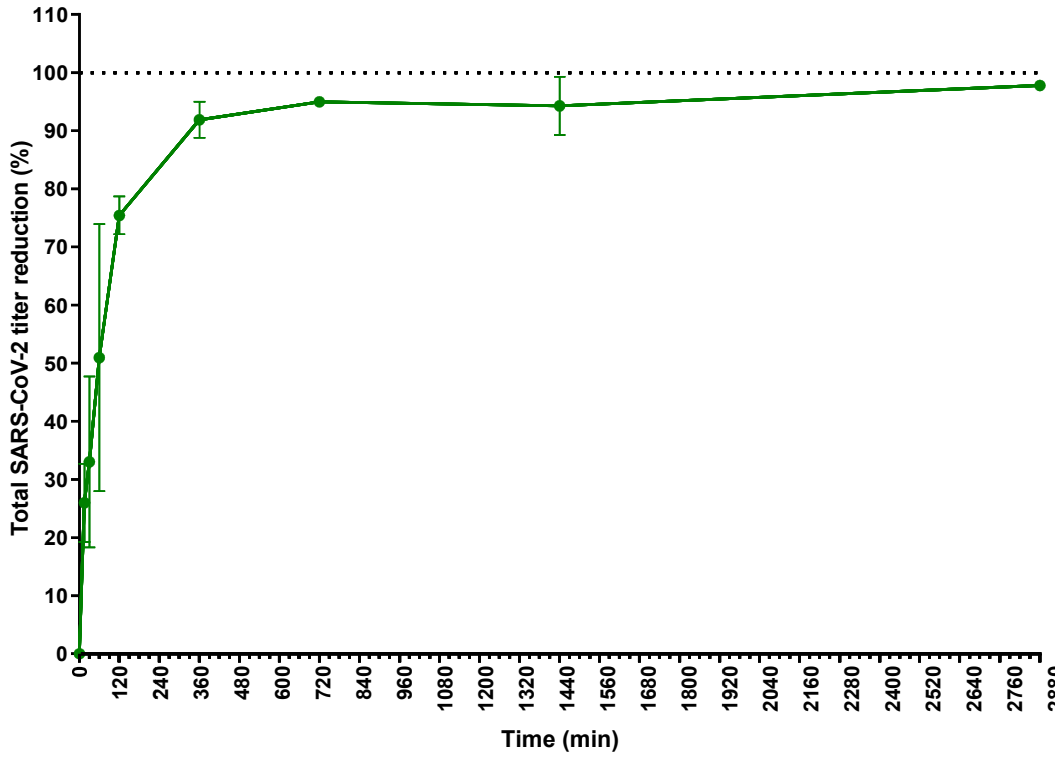

Figure 3. Total reduction (%) of SARS-CoV-2 inoculum collected at different time points (from 0 to 2880 minutes) after infection from 24mm x 24mm aluminum foil pieces exposed to a RESPR HVAC device.

CONCLUSIONS

While using the RESPR HVAC device, a maximum reduction of 99.991% of SARS-CoV-2 infectious particles on an aluminum surface was reached after 1440 minutes of exposure. More than 97.8% of this reduction was detected 360 minutes after the initial exposure.