ACTIVITY OF C-GUARD NON-UV LIGHTS AGAINST CORONAVIRUS

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EXECUTIVE SUMMARY

The antiviral activity of the C-Guard Non-UV lamp was tested against mouse coronavirus (MHV-1). The lights were able to reduce the number of viruses by 36% after 15 minutes in operation and by 52% after 60 minutes operation.

AIM

To determine the antiviral activity of the C-Guard Non-UV lights against the mouse coronavirus.

MATERIALS AND METHODS

VIRUS

The coronavirus Murine Hepatitis Virus (MHV-1; ATCC/VR261) produces disease in mice similar to SARS-CoV-2 which causes COVID-19 in humans. MHV-1 is recognised by the Therapeutic Goods Administration of Australia (TGA) as the appropriate surrogate for testing to support claims about effects on SARS-CoV-2 and other human coronaviruses. The coronavirus was suspended in Dulbecco's Modified Eagle Medium (DMEM) to a concentration of 10^4 plaque forming units (PFU)/ml.

TEST DEVICE

1. 2x 18W Non-UV Lights

The lights were supplied by C-Guard Lights and were used as per the manufacturer's description.

STUDY DESIGN

1. Test conditions and viral collection:

The test lights were placed inside a class 2 Biosafety cabinet. The viral inoculum was placed in wells (200 µl/well) of 96 well cell culture plates. The viral inoculum was exposed to the 2x lights placed 15 cm from the top of the plate for up to 180 minutes (Figure - 1). Test samples were collected from wells after 60, 90, 120, and 180 minutes of exposure and cultured to estimate the number of viable viruses. Control samples were exposed to white light for 180 minutes. Each test run was conducted in duplicate on two separate days.

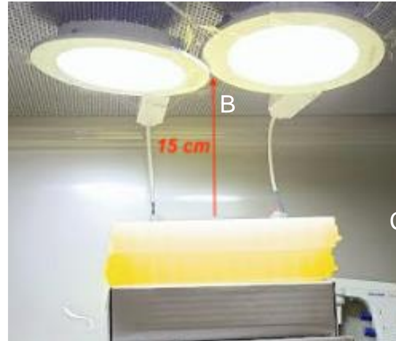

Figure 1: Test set up for testing the C-Guard Non-UV lights

2. Collection and culture of viral particles

Following exposure to the C-Guard light for 60 - 180 minutes, a 100 µl aliquot of the viral inoculum was collected from 2 wells. Test and control samples were diluted 10-fold in DMEM once and 50 µl aliquots from each test or control well were inoculated in duplicate onto wells of 24 well tissue culture plates containing a monolayer of mouse fibroblast cells (A9; ATCC CCL 1.4) in each well. The tissue culture plates were placed in an incubator at 37 ºC and 5% CO_2 for one hour to allow the viral particles to adsorb to the cells for 1 hour. After one hour an overlay medium (50:50 mixture of 2% agar and DMEM) was added to immobilize the virus and restrict virus growth to foci of cells at the sites of initial infection. The mouse cells were then incubated for a further 3 days at 37 ºC to allow viral replication and kill the underlying cells leading to plaque formation. After the 3-day incubation, the cells were fixed with 4% paraformaldehyde for 1 hour, stained using crystal violet to visualize the plaques and the number of plaques enumerated. The reduction in the number of viral particles from the test wells for each time point was calculated as below:

$$\frac{C_{180} - T_t}{C_{180}} x \ 100$$

C = Control, T = test, t = 60, 90, 120, or 180 minutes

Figure 2: Formula to calculate anti-viral activity

RESULTS

Sample	N	Viral Counts (pfu/ml)	Reduction (%)
Test (60 minutes)	4	20083 ± 6898	33%
Test (90 minutes)	4	8007 ± 4216	73%
Test (120 minutes)	4	6665± 1636	78%
Test (180 minutes)	4	1950 ± 305	93%
Control (180 minutes)	18	29981 ± 9567	-

CONCLUSION

The C-Guard lights can reduce the number of viable coronavirus particles by more than 70% after 90 minutes and more than 93% after 180 minutes of exposure to the C-Guard lights.

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