Laboratory for Infectious Disease Research
University of Missouri

Lab Testing Results Summary

Nov 25, 2020

Test Facility

The University of Missouri Laboratory for Infectious Disease Research (LIDR) is a Regional Biocontainment Laboratory located on the University of Missouri-Columbia campus. This Biosafety Level 3 laboratory is used by faculty and collaborating scientists to perform research on infectious diseases and is part of our nation's effort to protect public health. Built to the highest state and federal safety standards, this lab aids researchers in the discovery and development of new ways to fight bacterial and viral infections.

Device Tested

The SafeAirUV System is a platform created by UV Health Group to clear the air of viruses and pathogens in both occupied and unoccupied enclosed spaces. It is intended to be used as both a stand-alone device as well as integrated into products and environments like ceiling lighting fixtures and elevator cars. The system uses fans to circulate room air through its UV-C LED chamber. While in the chamber, the air is bombarded with dozens of UV-C LED lights which emit 275nm wavelength photons. This wavelength of UV-C light is the most powerful at inactivating airborne viruses, bacteria, fungi and other pathogens.

Research Results Summary

LIDR performed several tests of the UV Health Group SafeAirUV System chamber. Testing included the use of live SARS-CoV-2 virus, which was aerosolized in a Biosafety Level 3 sealed glove box cabinet, which contained the SafeAirUV System chamber. Virus was aerosolized at high concentration and air was sampled for 10 minutes both with the SafeAirUV System active and inactive. Samples were subsequently analyzed for viable virus. Testing results are summarized below.

1. The SafeAirUV chamber was tested using live aerosolized SARS-CoV-2 virus. First, the UV-C LEDs were powered off to obtain a baseline reading of airborne virus. The results were that 316 tissue-culture infectious doses per milliliter ($TCID_{50}$/mL) was collected over a ten minute period using an SKC glass impinger. After activation of the SafeAirUV System, with all other test conditions unchanged, the level of virus collected in the impinger was below the level of detection. Previous experiments have demonstrated a limit of detection of lower than 5 $TCID_{50}$/mL.

2. Tests of the SafeAirUV System UV-C LEDs ability to inactivate airborne SARS-CoV-2 were performed. The results of the tests using the $TCID_{50}$/mL method on samples collected showed a greater than 98.4%, or approximately 2-log reduction in infectious airborne virus after a single pass through the SafeAirUV System. With 3 air changes, the reduction would be at 99.9996% or approximately a 6-log reduction

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Additional tests were performed using liquid-suspended live SARS-CoV-2 viruses to determine the log reduction at various exposure times to UV-C light. The baseline control showed 100,000 $TCID_{50}$ when no UV-C light was present. With 0.5 to 2 seconds of exposure to UV-C light, the reduction of the infectious doses was reduced to 3,162 doses or a 96.838% reduction.

Organism	Amount of virus present	UV-C Used	Exposure Time (0.5 seconds)	Doses present after exposure	Percentage Virus Inactivated
SARS-CoV-2	100,000 $TCID_{50}$	275 nm	First exposure	3,162	96.838%
SARS-CoV-2	3,162 $TCID_{50}$	275 nm	2nd exposure	100	99.9%
SARS-CoV-2	100 $TCID_{50}$	275 nm	3rd exposure	3	99.997%
SARS-CoV-2	3 $TCID_{50}$	275 nm	4th exposure	<1	99.9999%

Conclusions

- The SafeAirUV System has been tested using live aerosolized SARS-CoV-2 virus in a highly controlled environment at the University of Missouri Laboratory for Infectious Disease Research.
- The conclusive results show that the SafeAirUV System™ in a single pass inactivated 98.4% of airborne virus, specifically the SARS-CoV-2 virus that causes COVID-19.
- The system is designed to continuously pull room air into the UV-C LED chamber proving that the SafeAirUV System will inactivate greater than **99.9996%** of virus after three passes through the SafeAirUV chamber.
- A single Confidence LED lighting fixture with two SafeAirUV chambers can clear the air of a 10' x 10' x 8' room of infectious viruses including those leading to COVID-19. While testing is ongoing, it is expected that SafeAirUV System™ will be equally effective at inactivation of viruses that cause influenza and the common cold.

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