Existing UV light technology has potential to reduce COVID-19 transmission indoors

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A recent study has shown that a UV light technology already used to prevent the spread of other airborne diseases in buildings has the potential to be effective against COVID-19.

The research, published in the journal *PeerJ*, found that upper room UV germicidal irradiation (UVGI) can kill SARS-CoV-2 virus particles, which can be transmitted by aerosolised droplets that float in the air.

UVC is known to be very effective at 'killing', or inactivating, microorganisms however this type of UV light is harmful to humans. Upper room UVGI cleverly uses UVC light to create an irradiation field above the heads of room occupants so it can disinfect the air whilst keeping people within the room safe.

The study, led by researchers from Queen Mary University of London and Leeds Beckett University, tested the feasibility of upper room UVGI to reduce COVID-19 transmission by analyzing historical published data examining the effect of UV irradiation on coronaviruses. Evaluating all the data, the research team showed that SARS-CoV-2 virus particles found in the air are likely to be susceptible to UVC, and also that the levels of UVC light required to inactivate the virus would be practical and safe for upper room applications.

It is now becoming widely accepted that transmission of SARS-CoV-2 virus particles through tiny respiratory droplets, is one of the main ways COVID-19 spreads between people. The risk of airborne transmission is especially high in poorly ventilated buildings and there is an urgent need for technologies to reduce the spread of COVID-19 within these spaces.

Professor Clive Beggs, Emeritus Professor of Applied Physiology at Leeds Beckett University, said: "Now we know that COVID-19 infection can occur from airborne exposure to the virus, finding ways to minimize the risk of transmission, particularly in buildings is becoming increasingly important. Whilst we know wearing masks and opening windows are effective ways to minimize the spread of COVID-19 indoors, these measures aren't always practical, especially in winter."

"Upper room UVGI is already a well-established technology and has proven effective to prevent the spread of other diseases such as measles and tuberculosis within buildings. This study shows that we have good reason to believe this technology could also protect indoor spaces such as offices, or restaurants and bars, and help to allow us to start to return to 'normal' life in a safe way."

Dr. Eldad Avital, Reader in Computational (& Experimental) Fluids and Acoustics at Queen Mary, said: "Now it becomes more of an engineering problem of how we can use this technique to prevent the spread in buildings. This is where computational fluid dynamics becomes important as it can start to address questions around how many UVGI lights are needed and where they should be used. One thing we know is particularly important for these systems is air movement, so for them to work effectively in poorly ventilated spaces, you might need to use ceiling fans or other devices to ensure that larger aerosol particles are adequately irradiated."

The research team are now focusing their efforts on understanding how UV air disinfection technologies could be put into practice. One project they're currently working on will investigate the use of a low-cost air purifier system to 'disinfect' air based on the UVC technology. "The idea is that air could be taken out of the room using an air purifier and disinfected with UVC light, before the 'clean' air is then put back into the room," said Dr. Avital.

"Another interesting area we're looking into is using ionizers to disinfect the air. These systems release negative ions into the air which latch on to positive ions, such as viruses, making them heavier. This causes them to fall to the ground or onto surfaces, where they can then be removed using normal cleaning approaches."

More information: Clive B. Beggs et al, Upper-room ultraviolet air

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disinfection might help to reduce COVID-19 transmission in buildings: a feasibility study, *PeerJ* (2020). DOI: 10.7717/peerj.10196

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