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Reduction of airborne coronavirus through UVC exposure

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**Objective:** The COVID-19 pandemic has highlighted the urgent need for innovative technologies to tackle indoor virus transmission via aerosols, especially in public spaces. Among the solutions gaining attention are air purification systems with various filter mechanisms and the use of specific ultraviolet (UV) wavelengths to deactivate viruses inside buildings. Our study aimed to assess the effectiveness of 275-nm UVC-LEDs against coronaviruses in aerosols.

**Methods:** To evaluate the efficacy of a prototype UV-LED air purification unit, we conducted experiments using Feline Coronavirus (FCoV) as a model virus. Aerosols were generated in a controlled chamber, and the purification unit was tested in two configurations: with a HEPA filter and with the UVC-LED chamber activated. Air samples were collected to measure the concentration of FCoV.

**Results:** Post-aerosolization, viral loads of 4.3 and 4.1 log10 TCID50/m³ were detected at 10 and 20 minutes, respectively, without using any measures. Filtration with HEPA showed a reduction of FCoV by 1.2 log10 and 2.4 log10 levels, for 10 and 20 minutes, respectively. Using UVC-LED radiation reduced FCoV by 1.2 log10 and 2.9 log10 level after 10 and 20 min, respectively.

**Conclusion:** Our study demonstrates the effectiveness of the air purification unit in reducing airborne FCoV concentration. The UVC module and HEPA filter contributed to this reduction, highlighting their potential to combat viral contamination indoors. These findings advance our understanding of UVC technologies in air purification systems and their relevance for mitigating infectious viruses in specific indoor environments.

**Keywords:** bioaerosol, UCV light, air purification