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Effectiveness of UV Light in Controlling Fungal Contamination of Air Handling Units. *E Levetin, C Rogers, and R Shaughnessy, The University of Tulsa, Tulsa, OK*

Indoor fungal contamination contributes to building related diseases including hypersensitivity diseases. This problem is especially troublesome when the ventilation system is the source of the contamination. The present study investigated the effectiveness of germicidal UV lamps in reducing the fungal contamination within air handling units (AHUs). The study site was an office building in Tulsa, OK. The 4 main AHUs on 2 floors were selected for the investigation; these were designated as the study floor and control floor. In May 1997, air samples (Andersen samples) and insulation samples were collected from the 8 AHUs. Germicidal UV lamps were installed and activated in the AHUs on the study floor and operated 24 hrs a day throughout the summer and early fall. In late September, all 8 AHUs were resampled.

Dominant fungi in both the air and insulation samples include *Penicillium corylophyllum*, *Aspergillus versicolor*, and *Cladosporium* sp. These taxa accounted for >90% of the fungi isolated. In May mean concentrations of airborne fungi in the AHUs of the both floors were similar, 2165 colony forming units (CFU)/m³ on study floor and 2255 CFU/m³ on control floor. In the fall, the mean concentrations in the AHUs on the two floors were significantly different (<0.05) with 298 CFU/m³ on the study floor and 23,232 CFU/m³ on the control floor. The insulation samples showed similar results. In the spring, the mean concentrations were 2.125 x 10⁵ CFU/cm² on the study floor and 2.118 x 10⁵ CFU/cm² on the control floor. In the fall the mean concentration on the study floor had decreased to 3.053 x 10⁴ CFU/cm², while on the control floor concentrations were significantly higher at 2.232 x 10⁶ CFU/cm² (p<0.05). This study indicates that germicidal UV light can be an effective approach to reducing fungal contamination within AHUs.

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DISCUSSION OF THE E. LEVETIN ABSTRACT PRESENTED AT 55TH ANNUAL MEETING OF

“THE AMERICAN ACADEMY OF ALLERGY, ASTHMA & IMMUNOLOGY (AAAAI)”,

February 26, 1999.

Dr. Estelle Levetin studied a total of 8 air handlers on two floors of the Public Service Company of Oklahoma office building by both air sampling and surface sampling. One floor was set up as the control floor (no UVC) and the other as the test floor.

Air and surface samples from all 8 air handlers were taken and analyzed before the UVC fixtures were installed. From the air sampling it was found that there were approximately 2200 colony forming units (CFU)/m³ in the air of each air handler. The air handlers were sampled again after the cooling (condensate formation) season and the untreated (no UVC) air handlers had increased their numbers approximately 10 times while the UVC equipped units had reduced their numbers by about 10 fold in the same time frame. The net result was then a 2 log or 99% reduction in the number of microorganisms dispersed from the air-handling unit on into the occupied space.

Similar results were found with the surface samples taken from the air handler's insulation. Prior to installing UVC, each of the 8 air handlers showed approximately 2.1×10^5 CFU/cm². The post cooling season sampling showed that the untreated (no UVC) air handlers had increased their numbers approximately 10 fold while the UVC treated air handlers had reduced their numbers approximately 10 fold. Therefore again a 2 log or 99% reduction in the contamination of the insulation surface was achieved.

Dr. Levetin concluded, “that germicidal UV light can be an effective approach to reducing fungal contamination within AHUs”. Her studies were conducted using Steril-Aire® UVC Emitters™ designed specifically for high output and reliability in air handling equipment.