AIR CLEANING FOR AIRBORNE ALLERGENS BACKGROUNDER

Introduction

Air cleaning will be helpful for reducing airborne allergen levels only if a large component of the allergen is airborne (to enable filtration to have an effect).

Dust mite allergen is mainly associated with large particles (greater than 10❍m aerodynamic diameter). Thus, exposure is a very local event with the airborne allergens settling quickly after disturbance and, for the most part, unaffected by an air filter operating at a remote distance. Cockroach allergen is similar to mite allergen in size and becomes airborne after vigorous dust disturbance.

In contrast, cat and dog allergen is often less than 2 _m in diameter and can remain airborne for days. Several studies have indicated that effective air filtration (able to remove very fine particles) will reduce the amount of airborne cat allergen by approximately 2- to 4-fold (less reduction was noted in the presence of carpets). It is worthwhile to note that cat and dog allergens are often detected in schools where these animals were not kept, suggesting that persons with animals at home may carry allergens on their clothing into the school.

Mold spores ranging from 3 to 20 _m in diameter present a moderate to large bioaerosal exposure from smaller persistently airborne spores and/or resuspended particles. Filtration may reduce levels of airborne mold spores indoors; however, as with all airborne allergens, source control is the primary approach to reducing exposure. Moisture/relative humidity control is the preferred approach to prevention of mold growth indoors (see *Mold and Moisture Backgrounder*).

over the unintentional emission of ozone from electrostatic precipitators with continued

HVAC Air Filters

For best reduction of airborne allergen, the filters in HVAC systems should be of the highest grade, yet still be compatible with the system and the air handler fan. Higher efficiency filters may restrict air flow through the filter media, and if they are installed, it may be necessary to modify an air-handler's filter housing and replace/upgrade the fan motors to accommodate the increased pressure drop. Most central air handlers can support 30% dust-spot-efficient filters which represent a significant improvement over standard furnace filters (less than 10% efficient) in capturing particles of concern in the bioaerosol size range. However, a large fraction of bioaerosols less than 5 _m will still pass through a 30% filter. Filters with a dust-spot-efficiency in the 50% to 70% range are approximately 65% efficient at removing 1 to 3 _m particles and will remove the majority of 1 to 2 _m bioaerosols. Filters in HVAC systems must be properly installed (having a tight fit to keep air from passing around the filter), kept dry, and maintained for continued efficient operation.

Portable Air Cleaners

The use of portable air cleaners for supplemental control of particles (including bioaerosols) has increased in recent years. Such units should be appropriately sized for optimum airborne particle removal; that is, the rate of air circulation through a unit (the supply of cleaned air) must be greater than the source emission rate (the rate of particle production and release). This may be difficult to achieve for strong sources and in large spaces. Portable air cleaners using high-efficiency particulate air (HEPA) filters or electrostatic precipitators have demonstrated the highest efficiency with respect to airborne particle reduction. There is concern use. Ozone devices (those that intentionally disseminate ozone into an occupied indoor

environment) have not been shown to effectively remove bioaerosols, and ozone has not been demonstrated as an effective gas-phase biocide. Because ozone is a lung irritant, many health experts caution against introducing ozone into occupied spaces.

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