

The Birds

Pigeon droppings, feathers, and carcasses present a very real health hazard to building occupants.
by John P. Springston

Pigeons are ubiquitous in New York City. They are often found roosting and nesting in or around rooftop fan rooms and/or the ducts for the HVAC system in many buildings. In a number of facilities, I have found bird droppings, feathers, and even dead birds littering fan rooms where fresh air intakes are located. Such conditions can present a very real health hazard to the building occupants and need to be addressed.

In 1960, the first reports of allergenic hypersensitivity pneumonitis due to avian antigens were published. A similar condition was later described in pigeon breeders. Hypersensitivity pneumonitis (allergic alveolitis) is a potentially disabling lung disease characterized by a granulomatous inflammatory reaction in the pulmonary alveolar and interstitial spaces. This disease is frequently misdiagnosed as a pneumonia of infectious etiology. As a result, the prevalence of hypersensitivity pneumonitis in the general population is not known.

Allergic reactions in humans have been demonstrated against extracts of feathers, bird droppings, pigeon serum, and egg antigens. In one clinical study, most of the subjects indicated a history of recurrent exposure to dry bird droppings with subsequent onset, approximately 4-12 hours after exposure, of high fever, chills, fatigue, aches and pains, cough, and dyspnea.

In acute stages of this disease, pulmonary residual volume is often found to have increased. However, in the subacute and chronic forms of the disease, irreversible restrictive and/or obstructive respiratory impairment may be present. Continued antigen exposure may lead to end-stage pulmonary fibrosis. Hypersensitivity pneumonitis generally responds to corticosteroids or cessation of exposure by either removing symptomatic individuals from the contaminated environment or by removing the contaminants from the environment. However, because sensitized individuals may react to extremely low or even unmeasurable concentrations of antigenic material, their removal from the building environment may still be necessary even after decontamination.

Fortunately, only a small percentage, anywhere from one to five percent or more, of individuals exposed to an antigen will develop signs and symptoms of pulmonary disease. This cannot be explained solely on the basis of cumulative exposure to the antigen or the presence of antibodies to the specific antigen, since epidemiological studies of antigen-exposed populations have shown that serum antibodies are also found in a large number of healthy individuals. For example, antibodies to pigeon proteins have been found in up to one half of exposed pigeon breeders, while the signs and symptoms of hypersensitivity pneumonitis have been described in individuals without the antibodies. In some cases, the period of sensitization before a reaction occurs may be months or even years.

Other Agents
Besides exposure to avian proteins, other potentially hazardous agents may also be present. *Cryptococcus neoformans*, a yeast with a large polysaccharide capsule ranging in size from 3.5 to 8.0 microns in diameter, is generally considered an opportunistic pathogen. *C. neoformans* can be found in high concentrations in pigeon droppings but does not appear to infect the birds. Inhalation of the fungal spores can cause pulmonary infection, although it is typically mild and sometimes asymptomatic. In some cases, the primary infection may also manifest itself in the form of a painless skin lesion (i.e., pustule, ulcer, cellulitis, or subcutaneous skin mass).

Other Agents

However, in immunocompromised individuals, cryptococcal infection can cause meningoencephalitis with patients reporting headaches, cranial nerve palsies, vision problems, fever, nausea, and dizziness. In untreated patients, the fatality rate is quite high. Currently, *C. neoformans* disease affects six percent of all HIV-infected persons, ranking it fourth among AIDS-defining infections. From 1980 to 1989, the incidence of *C. neoformans* cases increased fivefold due to the AIDS epidemic. Amphotericin B and/or fluconazole is typically used to treat the disease, although relapses are particularly common when therapy is discontinued in HIV-positive patients.

Histoplasma capsulatum, though commonly associated with bat guano, can often be found in soil that is contaminated with fowl droppings. This dimorphic fungus is responsible for causing histoplasmosis, a potentially fatal infection. As with cryptococcosis, *H. capsulatum* infections result predominantly from inhalation of the aerosolized spores. Typically, symptoms may appear within five to 18 days after exposure to the spores. An estimated forty million people in the United States have been infected by *H. capsulatum*, with approximately 500,000 new infections occurring each year. Fortunately, asymptomatic or mild infections are the rule, with most infected individuals not even realizing their illness is histoplasmosis. If symptoms do occur, they typically will begin within 3-17 days after exposure. Histoplasmosis can appear as a mild, flu-like respiratory illness with a combination of symptoms including malaise, fever, headache, chest pains, dry or nonproductive cough, joint and muscle pains, chills, and loss of appetite.

A small percentage of histoplasmosis cases may have a chronic

progressive lung disease, resembling tuberculosis, which can worsen over a period of months and years. The rarest, and most severe, form of this disease is disseminated histoplasmosis. This form is particularly common in young children and people with weakened immune systems, including AIDS or cancer patients, and is characterized by a spreading of the fungus to other organs outside of the lungs. Disseminated histoplasmosis is fatal if untreated, although death can occur even when treatment is administered. Acute, severe pulmonary histoplasmosis usually occurs in small epidemics involving exposure to an aerosol containing numerous spores resulting from the disturbance of highly infected soil. Specific medications, including Amphotericin B, are available for treatment of histoplasmosis.

Pigeons, as well as their droppings and feathers, can also become the source for many other potentially dangerous fungi and bacteria. A pulmonary infection of birds due to *Aspergillus fumigatus* is not uncommon. Due to its pathogenic nature, *A. fumigatus* can be a very serious infectious disease threat to individuals who are immunocompromised. Healthy individuals who are exposed to this fungi can also develop allergic bronchopulmonary aspergillosis caused by hypersensitivity to the organism. Psittacosis, an potentially fatal infectious disease caused by the bacterium *Chtlamydia psittaci*, is occasionally associated with exposure to infected pigeons or their manure. The severity of disease can range from asymptomatic to severe systemic infection with pneumonia. Other fungi and bacteria that can also be found to inhabit feathers, droppings and/or decaying carcass' include *Paecilomyces*, *Mucor*, *Rhizopus* and *Bacillus*.

Abatement Measures

Once a flock of birds is found roosting in a building, immediate action should be taken. Proper abatement of the droppings, coupled with measures to prevent future infestations, is necessary in order to ensure the health and safety of the building occupants.

A written hazard communication plan should be prepared before beginning the work, and all workers should be informed of the risks associated with cleaning up the droppings. Workers need to wear proper personal protective equipment during the removal and cleanup operations. This equipment should consist of, at a minimum, disposable coveralls with a hood, disposable latex gloves, and NIOSH/

MSHA-approved full-face powered air-purifying respirators equipped with High Efficiency Particulate Air (HEPA) filters. Personal decontamination procedures, similar to those utilized for asbestos abatement projects, should also be used.

The HVAC system mechanical components should all be turned off during the cleaning procedures. During the gross removal of the bird droppings, feathers, etc., those materials should be sprayed with a mild bleach solution to reduce the potential of aerosolization of spores and contaminants. Adding a surfactant or wetting agent to the solution can further reduce the amount of aerosolized dust. The dampened materials should then be collected in double, heavy-duty trash bags and disposed of at a landfill.

Following the gross removal, the affected area(s) should then be disinfected. Household bleach is one alternative since it contains sodium hypochlorite, which has both bactericidal and sporicidal properties. In addition, household bleach tends to be more readily available and less expensive than most other chemical bactericides and sporicides. One disadvantage with hypochlorites, however, is that their activity is greatly reduced in the presence of organic matter.

Prior to using disinfectants other than bleach, their effectiveness for decontaminating environmental materials containing *C. neoformans* and *H. capsulatum* should be documented. Disinfectants that exhibit both biocidal and sporicidal properties include formaldehyde, glutaraldehyde, iodine, and iodophors. Material Safety Data Sheets for any disinfectants must be consulted to determine what additional protective equipment is required for the workers during application. All cleaning chemicals and disinfectants must be removed from the HVAC system prior to its reactivation.

After removal of all materials, the cleaned area should be inspected by a third party to ensure no dust or debris remains. Air and/or surface sampling is typically not necessary for clearance purposes.

Following decontamination, steps should be implemented to reduce the possibility of future pigeon infestation. Sturdy, high-quality bird screens or netting should be installed on all fresh air intakes, as well as exhaust ducts. Any openings to roof fan rooms need to be similarly protected. Semi-permanent repellents, such as mechanical anti-roosting systems consisting of angled

and porcupine wires, can be installed. Periodic inspections should be conducted to ensure both the integrity of the screens and wires, and that pigeons have not begun to take up residence in or around fan rooms and ducts. Finally, because most microbial agents are larger than 1-2 micrograms in diameter, filters with a dust spot efficiency of greater than 60 percent should be installed in the HVAC systems. ■

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