NATIONAL INSTITUTE FOR OCCUPATIONAL HEALTH

Division of the National Health Laboratory Service

BIOAEROSOLS

BIOAEROSOLS IN THE WORKPLACE

With every breath, we inhale not only life sustaining oxygen but also biological agents, and other pollutants that float in air. Although poor Indoor Air Quality (IAQ) is often viewed as a problem uncommon to modern buildings, linkages between air quality and disease have been known for centuries.

WHAT ARE BIOAEROSOLS?

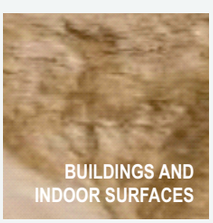
Bioaerosols are a collection of biological particles and their by-products and toxins that are found in the air. Examples include viruses, bacteria, fungi, mites, pollen, fragmented particles from microbial cells or insects, and by-products of living organisms (e.g. animal skin, latex powder, wood dust, mycotoxins, endotoxins, beta glucans or ergosterol, peptidoglycans, exotoxins, volatile organic compounds (VOCs)).

SOURCES OF BIOAEROSOLS?

Bioaerosols are everywhere in the environment and may originate from almost any natural or man-made surface. Many processes that are associated with human activity create bioaerosols. If these biological agents multiply in buildings, they can adversely impact IAQ, create hazardous health conditions for the occupants and also contribute to the deterioration of building components.

EXAMPLES

- Air conditioners
- Humidifiers
- Cooling towers
- Machines
- Nebulisers



- Aeration tanks
- Activated sludge

- Animal facilities
- Composting
- Harvesting
- Storage

- Ceilings & walls
- Carpet
- House plants
- Hospital wards
- Laboratories
- Libraries and archiving
- Offices
- Museums

- Saw Mill
- Manufacturing
- Mining
- Food Processing
- Textile Industry
- Construction
- Pharmaceutical
- Metal Industry

TRANSMISSION OF BIOAEROSOLS

Bioaerosols are always present in our environment and pose no problems in most cases if the levels are kept low. Transmission is mainly through inhalation but also by contact with skin and/or membranes.

HEALTH EFFECTS

Bioaerosols can cause severe health problems in workers that are exposed and can cause infection, allergy and toxic reaction. The diseases caused fall into three categories with examples:

Hypersensitivity diseases:

- Hayfever
- Asthma
- Skin Reactions
- Hypersensitivity Pneumonitis
- Allergic Rhinitis
- Allergic Sinusitis
- Conjunctivitis
- Humidifier Fever
- Dermatitis

Infectious diseases:

- Legionnaires disease
- Histoplasmosis
- Cryptococcosis
- Asperigillosis
- Tuberculosis
- Bronchitis
- Chronic Pulmonary Obstructive Disease (COPD)
- Anthrax

Toxic reactions:

- Cancer (e.g. lung, liver, nose)
- Organic Dust Toxic Syndrome (ODTS)
- Toxic pneumonitis

SYMPTOMS ASSOCIATED WITH BIOAEROSOLS

Employee overall health, productivity and comfort levels depends on the indoor environment. Sneezing, fever, dry throat, sinus congestion, dizziness, nausea, chest tightness, wheezing , coughing, shortness of breath, rhinitis, itchy and watery eyes, headaches, fatigue, skin and respiratory tract irritation. If you have some of these symptoms, note whether they disappear when you are away from work, or improve when you increase indoor ventilation (not always the case, some bioaerosol can originate from the ventilation system especially when not well maintained). If so, your symptoms may be triggered by something in the workplace, contact your health and safety personnel.

PREVENTION & CONTROL OF BIOAEROSOLS IN THE WORKPLACE

A comprehensive visual inspection is the most effective means of identifying situations where there may be problematic exposure to bioaerosols.

- identify and locate all the potential sources or reservoirs of bioaerosols
- identify the mechanisms of bioaerosol release into the air
- identify the corrective actions to be carried out and the measures to apply such as:
  - cleaning or removal of sources
  - installing mechanisms or equipment that limit propagation and bioaerosol release into the air
  - establishing safe working procedures
  - establishing a personal protection program
  - establishing strict personal hygiene and good house keeping rules

SERVICES OFFERED BY THE NIOH BIOAEROSOL LABORATORY

- Training on Biorisk Management
- Indoor Air Quality Assessments
- Microbiological Air Sampling: Bacteria and Fungi/moulds
- Culture and Identification of Microorganisms
- Consultations

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