

Hypersensitivity Pneumonitis

Also known as: Extrinsic Allergic Alveolitis; Farmer's lung; Mushroom pickers disease; Humidifier or air-conditioner lung; Bird breeder's lung; and many others – see table.

Responsibilities:

Hospital: Report by phone, fax, or mail

Lab: Report by phone, fax, or mail

Physician/Health care providers: Report by phone, fax, or mail

Medical Examiners: Report by phone, fax, or mail

Poison Control Centers: Report by phone, fax, or mail

Occupational Nurses: Report by phone, fax, or mail

Local Public Health Agency (LPHA): No follow-up required, unless outbreak occurrence

Report to the IDPH Bureau of Environmental Health Services:

Iowa Department of Public Health

Bureau of Environmental Health Services

Lucas State Office Building

321 E. 12th Street

Des Moines, Iowa 50319-0075

Phone (Mon-Fri 8 am - 4:30 pm): 800-972-2026

Fax: 515-281-4529

24-hour Disease Reporting Hotline: (For use outside of EHS office hours) 800-362-2736

Web: <https://idph.iowa.gov/ehs/reportable-diseases>

Report Form: Environmental & Occupational Report Form on web

1) THE DISEASE AND ITS EPIDEMIOLOGY

A. Agent

Hypersensitivity pneumonitis is a syndrome of cough, dyspnea, and fatigue caused by sensitization and subsequent hypersensitivity to environmental antigens, frequently related to occupational exposures. ICD-10 codes J67.0-J67.9 refer to hypersensitivity pneumonitis due to organic dust, and exclude pneumonitis due to inhalation of chemicals, gases, fumes or vapors (J68.0)

These dusts can be derived from a variety of sources, such as dairy and grain products, animal dander and protein, wood bark, and water reservoir vaporizers. Over 300 antigens have been identified as triggers for hypersensitivity pneumonitis, although farming, birds, and water contamination account for about 75% of cases. The most common antigens are thermophilic *Actinomyces* species and avian proteins; the most common diseases are farmer's lung and bird fancier's lung.

Hypersensitivity Pneumonitis Syndrome – Various Types and Sources

Syndrome Names	Antigen or Agent	Exposure Source
Bagassosis	Thermophilic actinomycetes	Moldy bagasse (sugar cane)
Cheese worker or washer's lung	<i>Aspergillus clavatus</i> ; <i>Penicillium casei</i> ; <i>Penicillium roqueforti</i>	Moldy cheese
Coffee worker's lung	Coffee bean dust	Coffee beans

Syndrome Names	Antigen or Agent	Exposure Source
Compost lung	<i>Aspergillus</i> sp	Compost
Farmer's lung	Fungi, especially <i>Aspergillus</i> sp; Thermophilic actinomycetes	Vegetable compost (moldy grain, hay, silage)
Mushroom worker's lung	<i>Hypsizigus marmoreus</i> Thermophilic actinomycetes	Mushroom compost
Potato riddler's lung	<i>Aspergillus</i> sp Thermophilic actinomycetes	Moldy hay around potatoes
Tobacco grower's lung	<i>Aspergillus</i> sp <i>Scopulariopsis brevicaulis</i>	Tobacco plants
Tobacco grower's lung	<i>Botrytis cinerea</i>	Moldy grapes
WATER		
Hot tub lung	<i>Cladosporium</i> sp <i>Mycobacterium avium</i> complex	Contaminated mist and mold on ceilings and around tub
Humidifier lung	<i>Aureobasidium</i> sp; <i>Candida albicans</i> ; Thermophilic actinomycetes	Contaminated water in air- conditioning or humidification systems
Sauna taker's lung	<i>Aureobasidium</i> sp	Contaminated sauna water
Sewer worker's lung	<i>Cephalosporium</i> sp	Contaminated basements (sewage); sewers
Tap water lung	Unknown	Contaminated tap water
BIRDS		
Bird fancier's lung, including: hen worker's lung, pigeon breeder's lung, turkey handler's lung; feather plucker's lung; duck fever	Parakeet, pigeon, chicken, turkey, and duck proteins	Bird droppings or feathers
ANIMALS		
Fish food lung	Unknown	Fish food
Fish meal worker's lung	Fish meal dust	Fish meal dust
Furrier's lung	Animal fur dust	Animal pelts
Laboratory worker's hypersensitivity pneumonitis	Rodent proteins	Male rat urine and fur
Mummy handler's lung	Unknown	Cloth mummy wrappings
Pituitary snuff taker's lung	Animal proteins	Heterologous (bovine, porcine) pituitary snuff
Sausage worker's lung	<i>Penicillium nalgiovense</i>	Dry sausage mold
GRAINS		
Malt worker's lung	<i>Aspergillus</i> sp	Moldy barley
Miller's lung, Wheat weevil lung	<i>Sitophilus granaries</i> (wheat weevil)	Infested wheat flour
MILLING AND CONSTRUCTION		
Sequoiosis	<i>Aureobasidium</i> sp; <i>Graphium</i> sp	Redwood sawdust
Thatched-roof worker's disease	<i>Saccharomonospora viridis</i>	Dried grass and leaves
Wood pulp worker's disease	<i>Penicillium</i> sp	Oak and maple tree pulp

Syndrome Names	Antigen or Agent	Exposure Source
Wood trimmer's disease	<i>Rhizopus</i> sp; <i>Mucor</i> sp	Contaminated wood trimmings
Woodworker's lung	<i>Alternaria</i> sp; <i>Bacillus subtilis</i>	Oak, cedar, pine, spruce, and mahogany dusts
INDUSTRY		
Chemical worker's lung	Isocyanates	Polyurethane foam, varnishes, lacquer
Detergent worker's lung	<i>Bacillus subtilis</i>	<i>B. subtilis</i> enzymes in detergent
Vineyard sprayer's lung	Copper sulfate	Copper sulfate use
OTHER		
Byssinosis (brown lung)	Mill dust	Cotton, flax, and hemp dust
Lycoperdonosis	Spores from puffball (<i>Lycoperdon</i>) mushrooms	Alternative medicine or recreational use (mistaking puffballs for hallucinogenic mushrooms)

Table reference: Merck Manuals, 2016 <http://www.merckmanuals.com/professional/pulmonary-disorders/interstitial-lung-diseases/hypersensitivity-pneumonitis>

B. Clinical Description

Hypersensitivity pneumonitis is a syndrome of cough, dyspnea, and fatigue caused by prior sensitization over a period of time resulting in subsequent hypersensitivity to organic environmental antigens. Only a small proportion of exposed people develop symptoms.

Symptoms and onset: Hypersensitivity pneumonitis is categorized as acute, subacute, or chronic disease.

- Acute hypersensitivity pneumonitis: The acute form may develop 4-8 hours after heavy exposure to antigenic materials. Patients abruptly develop fever, chills, malaise, cough, chest tightness, dyspnea, and headache. Anorexia, nausea, and vomiting may also be present. Symptoms often resolve spontaneously within 12 hours to several days upon cessation of exposure.
- Subacute (intermittent) hypersensitivity pneumonitis: Subacute disease falls between the acute and chronic forms and manifests either as a productive cough, dyspnea, fatigue, and anorexia that develops over days to weeks or similarly to patients with acute disease, but superimposed on chronic symptoms that are less severe and last longer.
- Chronic hypersensitivity pneumonitis: Patients with chronic low-level antigen exposure, which is more common with bird owners, often lack a history of acute episodes. Disease manifests over months to years as exertional dyspnea, productive cough, fatigue, muscle wasting and weight loss. Clubbing has been observed in 50% of patients. Tachypnea, respiratory distress, and inspiratory crackles over lower lung fields often are present. In advanced cases, pulmonary fibrosis produces signs and symptoms of right heart failure, respiratory failure, or both. Removing exposure sources results in only partial improvement.

Complications: Pathologic changes are completely reversible if detected early and if antigen exposure is eliminated. Patients may develop complications of underlying medical problems during acute disease episodes. Acute disease is self-limiting with antigen avoidance; symptoms usually lessen within hours. Chronic disease has a more complicated prognosis: fibrosis is usually irreversible, but may not progress if the patient is no longer exposed to the antigen.

Diagnosis: Diagnosis requires a high index of suspicion in patients with compatible symptoms and a compatible occupational, avocational, or domestic exposure history. Chest x-ray, high-resolution CT (HRCT), and pulmonary function tests are done routinely. Bronchoalveolar lavage and biopsy may be necessary if results are inconclusive. The differential diagnosis is broad and includes environmental pulmonary diseases, sarcoidosis, bronchiolitis obliterans, connective tissue–associated pulmonary disease, and other interstitial lung diseases. Referral to a pulmonologist is recommended.

Clues in the history include

- Recurring atypical pneumonias
- Symptom onset after moving to a new job or home
- A hot tub, a sauna, a swimming pool, or other sources of standing water or water damage in the home or regular exposure to them elsewhere
- Having birds as pets
- Exacerbation and relief of symptoms in and away from specific settings

Examination often is not useful in making the diagnosis, although abnormal lung sounds and clubbing may be present.

C. Reservoirs:

Environmental reservoirs can be found wherever the host for the antigenic material is present. Areas with conditions that are conducive to fungi and mold growth, indoor and confined spaces with limited ventilation, and storage areas are more likely to concentrate allergenic materials.

D. Modes of Transmission

Transmission is usually through airborne inhalation of allergenic particles.

E. Incubation period:

Not an infectious agent; see symptoms and onset, above

F. Period of Communicability or Infectious Period

Not an infectious agent, although antigenic particles can be transferred on clothing and equipment to other locations, which could theoretically cause an allergenic reaction in a susceptible individual if enough antigenic material was present.

G. Epidemiology

Serological testing supports the clinical diagnosis of hypersensitivity pneumonitis by detecting antibodies to a number of different environmental antigens. However, the presence of antibodies does not necessarily indicate hypersensitivity pneumonitis. Antibodies may be detected in normal individuals. Studies have found up to 85% of farmers have antibodies to common allergens but show no evidence of disease.

Frequency - United States: Incidence varies considerably. Studies document 8-540 cases per 100,000 persons per year for farmers and 6,000-21,000 cases per 100,000 persons per year for pigeon breeders. High attack rates are documented in sporadic outbreaks. Approximately 52% of office workers exposed to an infected humidifier were infected, and 27% of workers at a molding plant for polyurethane foam parts were infected.

Prevalence varies by region, climate, and farming practices. Hypersensitivity pneumonitis affects 0.4-7% of the farming population. Reported prevalence among bird fanciers is estimated to be 20-20,000 cases per 100,000 persons at risk.

Mortality/Morbidity: Most patients recover completely after the inciting exposure ceases. Bird fancier's disease has a worse prognosis than farmer's lung. The outcomes of other varieties of hypersensitivity pneumonitis are more variable.

Sex: One epidemiological study revealed a male to female ratio of 1.2:1.

Age: Hypersensitivity pneumonitis is usually seen in the fourth to sixth decade of life. One study looking at 85 consecutive patients with hypersensitivity pneumonitis found a mean age of 53 +/- 14 years.

H. Bioterrorism Potential - None

2) DISEASE REPORTING AND CASE INVESTIGATION

A. Purpose of Surveillance and Reporting

- To quantify the impact of the disease in Iowa
- To identify and control outbreaks involving groups of people.
- To help identify high-risk sources (*e.g.*, materials at worksites, workers in a facility with excess dust or other allergen) and recommend interventions to assist in the prevention of additional cases.
- To monitor the emergence of new types of hypersensitivity pneumonitis or new risk groups.
- To assist in the development of recommendations for control or prevention.

B. Laboratory and Healthcare Provider Reporting Requirements

All cases are required to be reported.

Mandatory Reporting is required of health care providers, clinics, hospitals, clinical laboratories, and other health care facilities; school nurses or school officials; poison control and information centers; medical examiners; occupational nurses. Hospitals, health care providers, and clinical laboratories outside the state of Iowa for confirmed or suspect cases in an Iowa resident.

Additional information and reporting forms can be found in the Iowa Administrative Code [641] Chapter 1, which can be accessed through a link on the IDPH Bureau of Environmental Health Services web page at <https://idph.iowa.gov/ehs/reportable-diseases> . Call the IDPH EHS hotline at 800-972-2026 during regular business hours if you have questions.

C. Local Public Health Agency Follow-up Responsibilities - None; elective involvement in outbreak situations.

3) CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements - None.

B. Protection of Contacts of a Case - None.

C. Managing Special Situations

When Reported Incidence Is Higher than Usual/Outbreak Suspected

If an outbreak is suspected, investigate to determine the type and source of exposure and mode of transmission that may be involved. Clues in the history include recurring atypical pneumonias; symptom onset with a recent history of work or activity involving environments with exposure to allergens known

to cause the syndrome (see table); onset after moving to a new job or home; having birds as a hobby or pets; exacerbation of symptoms in specific settings and relief of symptoms away from specific settings.

Consult with the IDPH Environmental Health Occupational Health & Safety Surveillance program staff at (800) 972-2026 to help determine a course of action to prevent further cases, or to provide referral for additional information/action.

D. Preventive Measures

Workers should be protected by preventing or minimizing exposures to airborne contaminants by controlling dust at its source and by using controls such as ventilation and dust suppression. Exposure to dust and mold can be decreased by providing appropriate mechanical ventilation, wearing a respirator, storing only dried materials to prevent exposure to mold, and wetting materials before moving them to reduce exposure to dust.

The most important aspect of long-term management is avoidance of exposure to antigens. A complete change of environment is rarely realistic, especially for farmers and other workers, in which case dust control measures (such as wetting down compost before disturbing it) or using air filters or protective masks may be effective. Fungicides may be used to prevent the growth of antigenic microorganisms (e.g., in hay or on sugar cane), but the long-term safety of this approach is unknown. Extensive cleaning of wet ventilation systems, removal of moist carpets, and maintenance of low humidity are also effective in some settings. Patients must be told, however, that these measures may be inadequate in the presence of continued exposure to allergens.

4) ADDITIONAL INFORMATION

References

Merck Manual. <http://www.merckmanuals.com/professional/pulmonary-disorders/interstitial-lung-diseases/hypersensitivity-pneumonitis>

American Lung Association. <http://www.lung.org/lung-health-and-diseases/lung-disease-lookup/hypersensitivity-pneumonitis/>

Dusts From Decayed Grain, Hay, and Silage. 1992. National Agricultural Safety Database. nasdonline.org/document/1630/d001504/dusts-from-decayed-grain-hay-and-silage.html

CDC/NIOSH Health Hazard Evaluation Report HETA 92-0122-2570. 1996. www.cdc.gov/niosh/hhe/reports/pdfs/1992-0122-2570.pdf

NIOSH Request for Assistance in Preventing Organic Dust Toxic Syndrome, Publication 94-102, April 1994 www.cdc.gov/niosh/docs/94-102/

University of Iowa Hospitals and Clinics: <https://uihc.org/health-library/hypersensitivity-pneumonitis>

All links were active as of February 2018.