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Histoplasmosis

Histoplasmosis is a common disease throughout much of the United States. Most people never develop signs and symptoms of the disease and are not aware that they have been infected. In a few cases the infection develops into a serious condition. General Casualty has had a number of claims involving histoplasmosis in the past and loss control staff should be aware of the risk and potential controls.

What is histoplasmosis?

Histoplasmosis is an infection caused by inhaling spores of a fungus called *Histoplasma capsulatum*. Histoplasmosis is not a contagious disease and cannot be transmitted from an infected person or animal.

In the United States the fungus is most common in the central part of the country throughout the Mississippi, Missouri and Ohio River drainage ways. Animals such as dogs, cats and small wild mammals can also get the disease.

The fungus thrives in damp rich organic soils enriched by bird and bat droppings. These droppings are high in nitrogen content which is required by the fungus. It is particularly common in chicken and pigeon coops, old barns, caves and parks. Birds aren't infected with the fungus but can carry the fungus on their feathers and their droppings support the growth of the fungus.

Risk Factors for Histoplasmosis

The spores of the fungus are extremely light and float in the air when dirt and other contaminated materials are disturbed. Persons who work with heavily infected soils or have close contact with birds or bats are more likely to develop histoplasmosis. These include:

- Farmers
- Gardeners
- Poultry Keepers
- Construction Workers
- Demolition Workers
- Bridge Inspectors and Painters
- Pest Control Workers
- Roofers
- Restorers of Historic or Abandoned Buildings
- Landscape Gardeners
- Road Builders
- Archeologists
- Geologists

Workers who clean chicken coops or construction workers who work in old buildings where birds and bats have roosted are especially at risk. There are often large amounts of bird and bat droppings in the lofts and attics of old buildings.

Symptoms

The disease normally affects the lungs but symptoms will vary from individual to individual. It is estimated that 80% of the population is some areas have been exposed and carry antibodies for the fungus. The vast majority of people who are infected do not develop any ill effects or experience mild flu-like symptoms and never seek medical attention. If symptoms do occur, they start 3 to 17 days after exposure. Symptoms include fever, chest pain, dry cough, headache, muscle pains and chills. A chest X-ray may show distinct markings in the lung.

If the disease is untreated in susceptible individuals, it can progress to a chronic form where the infection spreads outside the lungs to other organs. Chronic histoplasmosis can be fatal, even if treated. People with compromised immune systems are at greatest risk. These include AIDS and cancer patients and those on immuno-suppressive drugs. Impaired vision and blindness can also occur in rare cases due to hypersensitivity to the fungus and not from direct contact of the microorganism with the eye.

Histoplasmosis can be diagnosed through a skin test similar to a TB test. A positive test shows that the person was exposed at sometime in the past and the test will normally be positive for the rest of the person's life. A previous infection can provide some partial immunity to future infection.

Although a skin test is useful, it does not help diagnose acute forms of the disease. The disease is normally diagnosed in these cases by measuring antigens in the patient's urine, blood serum or other body fluid or by culturing the fungus from tissue.

Treatment

Treatment of histoplasmosis depends on the severity of the disease. Mild cases require only treatment of symptoms while antifungal drugs are required for all chronic conditions and when there is acute pulmonary infection.

Control

Soil samples can be tested for the presence of the fungi but soil testing is time consuming and expensive and not practical in most situations.

In construction areas be alert to active and inactive roosts of blackbirds, starlings and grackles. The soil beneath trees where blackbirds are roosting or have roosted in the past should be suspected of having the fungus. Construction jobs involving disturbing and excavating the soil in these areas is a special concern.

Areas such as bird roosts, attics or buildings that contain accumulations of bird and bat droppings should be posted with warning signs. In some situations, fencing may be needed around the site and locks may need to be placed on doors to prevent entry to buildings and attics.

Before activities are started that may disturb material containing the fungus, workers should be informed of the hazard and a plan should be developed to protect workers and control the exposure.

Instead of dry sweeping or shoveling, wet down the area to suppress dust or use a dust suppressant. Once the material is wetted it can be collected in heavy plastic bags or 55 gallon drums for disposal. Truck mounted high volume vacuum systems with high-efficiency filters may be applicable when removing material from buildings and attics.

Some of the largest outbreaks of histoplasmosis occur during earthmoving activities at construction sites. An outbreak in Indianapolis, Indiana in 1978-79 caused 120,000 people to be infected and 15 deaths. Contaminated airborne dusts and windy conditions were the cause of the outbreak. Work practices that control dust are important. Water sprays and other dust suppression techniques should be used during construction, excavation or demolition in areas where *Histoplasma capsulatum* is endemic. Earth moving equipment should have enclosed air conditioned cabs. Air filters should be inspected and be replaced regularly.

Personal Protective Equipment

Control of exposure to *Histoplasma capsulatum* through dust control measures alone may not protect employees. Use of personal protective equipment will still be necessary for some activities. During removal of accumulated bird and bat droppings in buildings and attics, a NIOSH approved respirator should be worn. Workers in poultry barns and at some dusty outdoor construction sites should also wear respirators.

Unfortunately, published data on *Histoplasma capsulatum* spore levels are either outdated or not available. There are also no established exposure limits. Therefore, respirators should be chosen based on the potential degree of risk of the job task.

For low risk tasks such as site surveys of bird roosts, collecting soil samples or inspections of buildings and attics, disposable dust masks and half-face elastomeric air purifying respirators should provide adequate protection. Type N100 filters should be used. For earth moving activities in highly contaminated soils, half-face respirators should be worn by equipment operators. Full-face respirators are recommended for extremely dusty conditions such as work in poultry barns. Employees involved with bird and bat dropping removal in buildings and attics should wear supplied air respirators.

In addition to respiratory protection, disposable clothing and shoe covers should be worn over regular work cloths to prevent contamination with *Histoplasma capsulatum*. The disposable clothing will reduce or eliminate the potential of transferring spore containing dusts away from the work site such as to a car or home. If there is a likelihood of falling overhead material, hooded disposable clothing should be worn. After working in spore contaminated areas, disposable clothing should be removed and be disposed in sealed plastic bags before the respirator is removed.

Loss Control Activities

Loss control staff should be aware of the potential of histoplasmosis exposure when evaluating job sites and work activities of accounts they survey and service. Is the account involved with poultry farming or another high risk industry? If the account in involved in construction, do they perform demolition, remodeling, roofing or are they involved with restoration of old buildings? Does the account perform excavation or earth moving activities in areas with potential exposure? Is the account and their employees aware of the exposure and potential controls? What procedures are used when bird or bat droppings are encountered in

buildings? Does the account inspect buildings for bird and bat droppings before they start a job? Are they actively involved with removal of bird and bat droppings? What PPE and respirators are used? What sort of dust controls are used at construction sites?

Manganese and Parkinson's Disease

Welders are exposed to a number of metal fumes depending on the type of welding that is conducted. One of the most common metal exposures during welding operations is manganese which is present in small quantities in most steel alloys. In recent years there has been a controversy regarding welders exposed to manganese and Parkinson's disease. Some of these cases have been in the media and trial lawyers are actively seeking clients who may have performed welding.

Manganese is an essential nutrient in small quantities that is required for the formation of connective tissue and bone, for carbohydrate metabolism and as a catalyst in many metabolic processes in the body. Manganese can be absorbed by the gastrointestinal tract or by inhalation. In the occupational setting inhalation is the primary route of exposure.

Welders are exposed to many different metal fumes. The most common metal exposures include iron, manganese, copper, chromium, nickel, aluminum and zinc. Mild steel also known as carbon steel is primarily composed of iron and around 2% manganese. Manganese is present in stainless steel, cast iron and other alloys to increase hardness, stiffness and strength. Manganese is also present in the filler wire (electrode or stick) consumed during the welding process. During welding, some of the metals are vaporized due to the high energy in the welding arc and these vapors rapidly condense in the cooler region outside the arc to form very small particles which is defined as fume. These particles are very small (0.001 to1.0 microns) and go deep into the lungs when inhaled.

Inhalation of manganese mainly affects the central nervous system. The toxicity and health effects from high exposures to manganese have been known for many decades. These high level exposure cause a disease known as manganism which is characterized by disabling neurological effects similar to Parkinson's disease also know as Lou Gehrig's disease. Manganism is a progressive disease that begins with mild symptoms and then progresses to altered gait, fine tremor, and in some cases psychiatric disturbances. These are some of the same symptoms as Parkinson's disease. Historically, these high levels of exposure have been associated with smelting plants, mills and battery plants.

Exposure to low levels of manganese such as in welding operations and development of Parkinson's disease is more controversial. Websites for trial attorneys state that there is a definite relationship between welding and the disease. A review of the scientific literature and recent studies provides evidence of some subtle neurological effects in welders but there are no conclusive studies that show that manganese exposure in welding operations causes Parkinson's disease.

Although some studies suggest some neurological effects associated with manganese exposure, the Parkinson's disease, issue is controversial and there is need for additional research. Until some of questions are answered and because of the trial lawyer activity, it is prudent to take a conservative approach with regards to manganese exposure in welding operations. The ACGIH has established a TLV of 0.2 mg/m^3 as an eight-hour TWA to prevent the central nervous system effects. OSHA has a PEL of 5 mg/m^3 as a ceiling limit but this is out of date with the most recent toxicological data and the TLV should be used as the control level.

Control of fume in general at welding operations will also control manganese exposure. The most effective controls involve use of local exhaust ventilation systems and hoods to capture fumes near the point of welding. Captured fume can be exhausted from the building or be cleaned by an electrostatic precipitator (smoke hog). This type of control works best at dedicated welding benches. Work in confined spaces or on large work pieces make the use of hoods more problematic. In these cases, respiratory protection may be the only control option.

Respirators are available that can be worn under welding helmets but another effective option is a welding helmet that incorporates a powered air purifying respirator. This type of helmet delivers filtered air through a hose to the welding helmet.

Hard Metal Disease

Hard metal disease is a fibrotic lung disease caused by exposure to tungsten carbide dust. Tungsten carbides are used on the edges of tools and saw blades. Grinding and sharpening of carbide tools and blades poses a risk for hard metal disease.

Carbide is made by sintering (using heat and pressure) to bond powders of tungsten carbide and cobalt. Other carbides such as tantalum carbide are also produced in this way. Carbides have extreme hardness second only to diamond and are used as inserts on saw blades and for high speed tools exposed to high temperatures and wear.

Since the raw ingredients used to make carbides include fine powders, exposure to dusts is a potential concern at carbide factories and at tool making operations. A more common potential exposure to carbides at General Casualty is from exposure during grinding and finishing of carbide surfaces such as in tool rooms and cribs at metal working facilities.

Exposures result from the dust generated during the grinding and finishing processes. This dust causes hard metal disease which is a fibrotic disease with both an acute and chronic form. The symptoms of the disease include shortness of breath, cough and sputum production. The symptoms may moderate if the employee is removed from the exposure at an early stage. The condition is diagnosed through a chest x-ray showing a distinctive form of fibrosis in conjunction with a work history of exposure.

The cause of the disease is uncertain and may be related to the cobalt in the sintering material used to make the carbide. Carbides contain about 10% cobalt. Numerous studies have shown that cobalt causes asthma and changes in pulmonary function. Mild fibrotic lung changes and cases of asthma have been found in workers exposed to concentrations of cobalt at 0.1 to 0.2 mg/m^3. Airway obstruction, respiratory irritation and changes to the heart have been found in workers exposed to a concentration of 0.06 mg/m^3. Cobalt has also been shown to cause cancer in animal studies. The ACGIH has established a TLV for cobalt of 0.02 mg/m^3 as an eight-hour TWA to minimize these effects. The OSHA PEL is 0.1 mg/m^3. The greatest exposure concern is for employees who spend the majority of the shift operating grinding and tool sharpening equipment. In many tool rooms employees perform other tasks throughout the day so the duration of exposure is reduced.

Control of exposure to carbides involves the use of local exhaust ventilation systems at grinders and tool sharpening equipment. Wet grinding with metal working fluids can help control dust but may create aerosols containing the carbide. Exhaust ventilation systems should also be used as a control measure even when using coolants to control mists containing cobalt. Leaks of coolant, dry sweeping and use of air hoses for cleaning surfaces can also cause exposure. Cleaning surfaces with a HEPA (High Efficiency Particulate) vacuum is the preferred cleaning method. Since studies show ingestion of cobalt can cause heart disease, good personal hygiene practices such not allowing food or drink in areas where tools are ground or sharpened should be implemented.