Histoplasmosis
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**Disease Etiology:**

Histoplasmosis is an infection resulting from the inhalation of spores belonging to the fungus *Histoplasma capsulatum*. [1] This one of three fungi that belongs to the genus *Ajellomyces*. [7] The disease state is also known as “Reticuloendotheliosis”, “Caver’s Disease” and “Ohio Valley disease”; and is the most common endemic mycosis which causes infection. [2] The fungus is found in the environment and most commonly associated with bat and bird droppings. [5] *H. capsulatum* is known as a thermally dimorphic soil fungus; at 25˚ C it exists in a mycelial form and at body temperature (37˚ C) it exists as a yeast. [2][3]

**Disease Transmission:**

*H. capsulatum* is found in bird and bat droppings, as well as the soil they contaminate. Bats can become infected and transmit the fungus through their excrement. Birds cannot become infected but their excretions enhance the soil allowing for greater mycelial growth. [6] Infection occurs when spores become airborne due to soil disturbance and are subsequently inhaled by humans into the lungs. [4] The spores are also transmitted via air currents and can be carried for miles. [3] Although spores are easily encountered in the environment they cannot be transmitted amongst humans or from animals to humans. [1]

**Reservoirs:**

Contaminated soil harbors the dormant form of the histoplasmosis causing agent. Upon inhalation by humans the body’s warm environment allows the fungus to morph into its virulent form. A majority of carriers are asymptomatic and the infection is overcome with little to no intervention. Cases are most commonly attributed to areas along the Ohio and Mississippi river valleys, parts of Africa and areas under construction. [4]

**Specific Microbial Characteristics:**

*H. capsulatum* is dimorphic, thus it exists in 2 forms: its mycelial form produces macroconidia and microconidia. These spores are responsible for infection. [2] It is a facultative intracellular pathogen, thereby it becomes virulent by morphing within a host. Its initial form allows it to move into the human body and make its way into the small areas of the lungs. It morphs into the yeast form after consumption by a macrophage. The yeast form is able to replicate its DNA at the internal body temperature while the mycelial form cannot. [7]
Specific Tests for Identification:

There are a series of tests which can be done to determine the presence of infection as well as to show the presence of H. capsulatum. Bronchoscopy, chest x-rays and Chest CT scans can be used to show the damage caused by the fungus while a spinal tap can reveal increased immune function in response to the causative agent. [6] Testing for the presence of histoplasmosis can be done through: biopsies of the skin, lungs, liver and bone marrow, blood and urine tests to detect foreign proteins and antibodies and cultures of blood, urine and sputum. The cultures provide a definitive presence of the fungus but can take up to 6 weeks. [5]

Signs and Symptoms:

If present most symptoms occur between three and seventeen days after exposure. The most common symptoms are fever, chills, headache, dry cough, chest discomfort and muscle aches. Less commonly joint pain and rash can develop. The fungus presents the greatest threat to those who are immunocompromised and infants. In severe cases the fungus spreads throughout the body, this is known as disseminated histoplasmosis. At this point treatment is required and may result in death. [6]

Historical Information:

Histoplasmosis is also known as “Darling’s Disease” a tribute to its founder, Stephen Darling, in 1905. By the 1930s the disease was known to be widespread. Until its discovery and the ability to accurately determine H. capsulatum infection most cases were determined to be tuberculosis as both infections can present in similar fashion. [7]

Virulence Factors:

The non-virulent form of the fungus produces spores which are inhaled by individuals and displaced in the lungs. In the lungs the microconidia settle into alveoli where there are ingested by macrophages. In this environment the fungus is able to morph into its yeast form which allows it to germinate. [2] In a healthy individual the immune system is able to identify the foreign presence, consume it and calcify it to eliminate the threat. However in weaker individuals the yeast is able to use the host cell to travel throughout the body via the lymphatic system and infect other organ systems, this results in disseminated histoplasmosis. [7] The dimorphic properties of the fungus present two issues for the immune system. It allows it a mechanism to be distributed throughout the body as well as the ability to change the structure of its outer wall. The difference in protein structure between the two forms requires the body to react to two different antigens which delays the immune response. [2] The presence of the fungus results in chest discomfort and the cough while the immune system’s response is responsible for the fever, chills, etc. [7]
Control/Treatment:

Control of the fungus is impractical and unnecessary as most cases don’t present any real harm. Most cases pass without any intervention, however if needed various antifungal medications can be administered. These medications: Sporanox, Diflucan, Itraconazole, Amphotericin B and Ketoconazole; come in pill and intravenous form and are administered according to severity of the disease. [4] The duration of treatment is one to two years for severe cases and as a short as a few weeks for less severe cases. Most cases are treated with IV Amphotericin followed by oral administration of Itraconazole or Diflucan [6]

Prevention/Vaccines:

Currently no vaccine for histoplasmosis is in existence as no need for such a vaccine has been determined. Beyond avoiding areas where the disease is known to prevalent the only other form of prevention would be decontaminating sites known to have high concentrations of the fungus. The disease has not proved itself to be dangerous enough to require such action. [4]

Local Cases/Outbreaks:

The fungus thrives in areas of moderate climate and humidity. In the United States it is found in greatest concentrations along the Ohio and Mississippi river valleys. Thousands of cases occur annually however the lack of severity causes many of the cases to go unknown. Outbreaks are generally limited to areas of construction involving old contaminated buildings. [5]

Global Cases/Outbreaks:

Cases of histoplasmosis are generally limited to Central and North America as well as parts of Western and Central Africa and the island of Madagascar. In Africa the disease is also caused by H. capsulatum var. duboisii and known as African Histoplasmosis. Skin sensitivity tests using both types of H. capsulatum antigens resulted in positive tests in 9.4% of young adults residing in areas near caves and 35% among cave guides, traders and farmers in the same region. [9] These results display the prevalence of asymptomatic histoplasmosis in among Africa’s endemic regions.
References:


   http://medind.nic.in/iae/t00/i4/iaet00i4p271.pdf. 02/23/2014