ARE YOU EXPOSING YOURSELF TO HISTOPLASMOSIS ?

Garry K. Smith

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Around the world, hundreds of thousands of people each year are affected by a fungal infection called Histoplasmosis. In many areas of South America, Asia, Europe, Africa and East Central United States, the disease has been found in the droppings of domestic birds, such as fowls as well as starlings and other birds which often nest around houses. To humans this microscopic fungus is potentially fatal if the infection is not treated.

At this stage you are probably saying to yourself, "what has this to do with caving".?

Evidence exists that the fungus Histoplasma capulatum grows in guano, (bat droppings) and that it may be spread by bats flying from one roost cave to another. The fungus can survive in the intestinal contents of bats as well as transmitted to other locations by wind. To date the fungus has been detected in some caves inhabited by the Bent Wing Bat (Miniopterus schreibersii blepotis) however there is no conclusive evidence that it is confined to guano of this bat species.

Other names for this disease include:- "Histo", "cave disease", "cave fever", "Darling's disease", "Ohio Valley disease, "Tingo Maria fever", "reticuloendotheliosis" and "reticuloendothelial cytomycosis".

Habitat of the Fungus.

Histoplasma capulatum is an organism which grows in soil containing a high nitrogen content, generally associated with guano of birds and bats.

The fungus reproduces by releasing spore of 2 to 5 micron in size, to the air. Ideal conditions for this to occur is in caves with high humidity (ie 67% to 87% or more), temperatures of around 20 to 29 degrees C and the presence of dry guano. Many overseas reports have recorded high concentrations of the fungus in guano around poultry sheds. In "open" environments the occurrence of the fungus is generally restricted to between latitudes 45 degrees N and 45 degrees S. Outside of this tropical zone, concentrations of the fungus is restricted to appropriate environmental conditions which can occur in "closed" environments such as caves. This is due to the stable conditions which exist inside caves, where as the surrounding countryside may be too dry or cold for sustained proliferation.

Effect on the Human Body

Histoplasmosis is a fungal infection which can affect the whole body and is caused by inhalation of an aerosol of soil, dust or guano which contains fungal spore. When the airborne spore is breathed in by cavers it may infect the lungs. The degree of infection in humans varies widely, depending on the individual's immune status and degree of exposure to the fungal spores.

In most cases the spore are introduced in such a quantity as to produce a mild form of the disease and thus builds up the bodies immunity to the fungus. This form of infection is referred to as Asymptomatic and the infected person experiences no noticeable symptoms.

When a person is subjected to high exposure, some spore reach the alveoli and begin to germinate. Conversion to an invasive yeast phase takes place, and multiplication occurs by binary fission.

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The second form of infection is Acute Pulmonary Histoplasmosis. Symptoms may occur two to three weeks after infection and include a general feeling of being unwell as if suffering a mild influenza with a raised temperature, malaise or tiredness and pleuritic chest pain. In most cases the person with a mild infection quickly recovers with no treatment.

The more severe third form of infection is called Chronic Pulmonary Histoplasmosis. The condition of persons with high exposure and/or low immunity to the fungus, may quickly deteriorate to include fever, night sweating, headaches, shortness of breath, lack of energy, muscular aching, weight loss, dry coughing and severe pain around the lungs. If untreated, the lungs continue to be slowly destroyed and death can occur months or years later from bacterial pneumonia or heart failure.

The most severe form of infection is called Acute Disseminated Histoplasmosis and the yeasts are spread throughout the body via the blood stream.

Overseas statistics show that in a small percentage of cases the disease may disseminate and infect the lymph glands, liver, spleen and other vital organs, resulting in fever and weight loss. Chronic respiratory infections resemble chronic pulmonary tuberculosis. The disease progresses over a period of months to years, possibly with periods of remission. This form is more common in males over 40 and often results in death. Symptoms at the chronic stage may vary, depending on the organs involved. Unexplained fever, anaemia, heart inflammation, meningitis, pneumonia and mucosal ulceration of the mouth, bowel or stomach may be seen. The infection is not transmitted from person to person and there is no immunization presently available.

It may be of interest that Histoplasmosis is not only confined to humans, as other animals such as dogs, cats, rats and foxes are also susceptible to infection.

Occurrences in Australia.

Prior to 1972 in Australia, the disease had only been identified on several occasions. In none of these cases was the infectious environment conclusively linked with bats. However between 1972 and 1976 a large percentage of cavers who visited Church Cave (WJ-31) at Wee Jasper contracted histoplasmosis.

This sparked a spare time study by Applied Science lecturers and students at the Riverina College of Advanced Education, Wagga Wagga to isolate the source of the fungus. On many occasions the researchers wearing respirators designed for poisonous pesticide sprays entered the cave to collect samples of cave air and guano from the deep layered deposits. Despite wearing respirators, three out of the eight researchers contracted lung infections. The investigation continued, however it wasn't until 1983 that the fungus was grown in laboratory cultures from samples of guano, soil, respirator filters and phlegm taken from the last of the histoplasmosis sufferers.

In November 1993 a group of 12 cavers undertook exploration of the Glenrock Caves located 120 Km north-east of Muswellbrook. Sixteen days after entering the caves, one of the cavers was admitted to the John Hunter Hospital (Newcastle, N.S.W) and diagnosed as suffering from histoplasmosis. Conclusive diagnosis is pending final fungal culture results, however this appears to be just a formality. The exact origin of the infection has not been positively identified, however there is a strong possibility that the fungal spore originated in the Glenrock cave called "Bats and Bandicoots" (GR-43). This cave contained large quantities of bat guano and has a cave climate suitable for the fungus' propagation. During exploration the cave temperature was uncomfortably hot and the guano was noticed to be dry and powdery.

There were six cavers who entered GR43 in November 93. Only one came down with the infection. The person involved suffered a lot of pain and discomfort from the infection, which appears to have permanently damaged a large section of his lungs. He spent 12 days in hospital and has incurred large medical bills, endured considerable inconvenience during medical tests and lost lots of work time.

This makes Histoplasmosis an infection not to be dismissed lightly with the old saying "it can't happen to me".

Hills Speleological Club Ltd. have published a comprehensive guide to the Caves of Glenrock. Between 1983 and 1987 they collected data and mapped the 108 caves in the area. This involved hundreds, possibly thousands of man-hours underground. I believe there were no reported cases of histoplasmosis even though the cave in question has been mapped and explored on several occasions.

Since these are not the only breeding caves for the Bent Wing Bats and no concrete evidence exists that they are the only species of bat to carry the disease, there is still the possibility for further outbreaks to occur in the future. Fortunately to date the occurrence of this disease in Australia is rare considering the numbers of people who enter caves containing bats each year. *Rippon (1974)* states, "Not all guano appears to serve equally well as a substrate", which might explain why the fungus to date, has not been isolated in guano of other Australian bats.

Diagnosis

There are several methods to diagnose the disease.

1. Involves laboratory examination of body tissue or fluids, often sputum or scrapings of lesions.

2. Histopathologic examination of several tissues such as bone marrow, liver, spleen and lung, stained with special fungal stain.

3. Tissue culture isolation of the fungus from sputum, blood, bone marrow, biopsy tissue, lesion scrapings or other body tissue and fluids.

4. Serologic tests may be used.

5. Histoplasmosis skin test is primarily an epidemiologic tool to define endemic areas. Its diagnostic value is limited as it does not distinguish between past and present infection, and non-specific reactions can result in false positives. (In 1972 around 100 speleologists were tested and approximately 30% returned a positive result).

6. Although not a conclusive diagnostic tool, a chest X-ray of severe cases will show many abnormal shadows in the lungs.

Previous severe infections may be noted on a chest X-ray film as small, scattered, radio-dense nodules in the lungs, mediastinal lymph nodes, and spleen.

Treatment

Most cases recover without any specific treatment. However even mild symptoms should be treated seriously as chronic infections may develop and result in damage to internal organs or in extreme cases death.

Benign localised lung infections should be treated, if necessary with bedrest and symptomatic care. In severe cases of histoplasmosis, the antibiotic of choice is intravenously administered Amphotericin B.

It should be noted that HIV positive sufferers have little chance of overcoming this fungal infection if contracted.

Conclusion.

If you have already visited a cave which contains dry dusty bat Guano, you have probably exposed yourself to the fungal spore. The more dust stirred up increases the chance of greater exposure and infection. Severity of infection may vary, depending on the degree of exposure and your state of immunity. Bear in mind that the disease may recur in later life once infected. Cavers should not become paranoid about Histoplasmosis, but moreover they should be aware of the possibility of infection and able to recognize the signs to assist in early diagnosis. Caves with wet or damp guano have greatly diminished chance of causing infection. If you must enter a cave with high humidity and dry guano, a good fitting fine dust mask may reduce (but not eliminate) the chances of infection, provided special care is taken to remove and dispose of contaminated clothes and wash hair before removing mask. If you suffer any Histoplasmosis symptoms after visiting a bat cave, see your doctor without delay. Make special reference to the possibility of Histoplasmosis and that it has common symptoms to tuberculosis (TB). Prompt action could save your life. The best prevention is to avoiding known sites of exposure.

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