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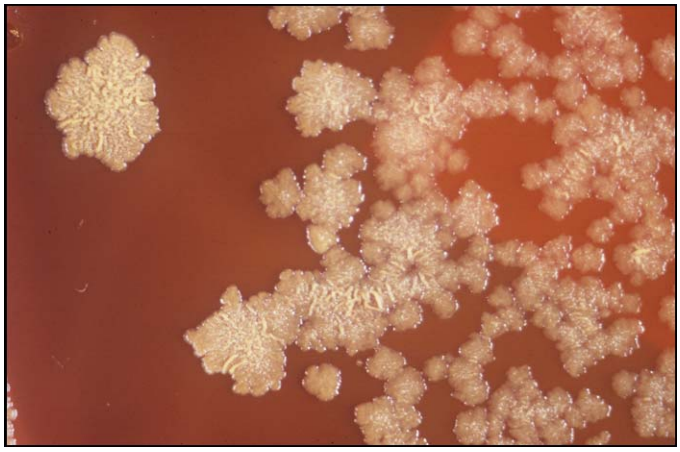
Non-tuberculous Mycobacterium

in Water Systems

What is non-tuberculosis mycobacterium?



Non-tuberculous mycobacteriums (NTM) are small, rod shaped bacilli that are found in the environment and generally cause infection or disease in individuals with preexisting conditions. NTM is a category of mycobacteria, and as the name states, these species do not cause tuberculosis. NTM can cause lymphadenitis, pulmonary disease resembling tuberculosis, skin disease, or disseminated disease. These bacteria have occasionally been isolated from drinking water distribution systems. Disease caused by M. avium complex has been linked to hospital drinking water in HIV patients.

What are the most common NTM species found in water distribution systems?

There are at least 33 mycobacterium species that are found in potable water and the most common environmental mycobacteria are:

- M. *avium* complex (MAC): M. *avium* and M. *intracellulare*; associated with pneumonia and gastrointestinal disease
- M. *chelonae*; associated with lung, skin, and soft tissue disease
- M. *fortuitum*; associated with lung, skin, and soft tissue disease
- M. *gordonae*; associated with prosthetic devices
- M. *kansasii*; associated with pulmonary disease or disseminated infection
- M. *mucogenicum*; associated with bloodstream infections
- M. *xenopi*; associated with pneumonia

Where are NTM found?

Ubiquitous in the environment, these bacteria have been isolated from the following:

- Soil
- Water systems; including tap, fresh, and ground waters
- Swimming pools and hot tubs
- Food

How do NTM enter water distribution systems?

Although some investigators view NTM as pathogens which contaminate water distribution systems, our perspective is that these bacteria may be part of the normal flora of water.

NTM are able to survive in water distribution systems because of relative resistance to chlorine. Biofilms and protozoal interactions have been suggested as favorable to growth.

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How are these bacteria acquired?

Non-tuberculous mycobacterium is acquired through ingestion, aspiration, or inoculation of the bacteria from water. There has been no evidence of human-to-human or animal-human transmission of the bacteria.

How can the growth of NTM be prevented in drinking water distribution systems?

There are several treatment options that can be implemented to reduce or prevent non-tuberculosis mycobacteria from colonizing in water distribution systems:

- Disinfectants applied to drinking water including copper-silver ionization, chlorine dioxide, and chlorine have been applied; however no controlled evaluations have been reported.
- Physical treatment such as UV irradiation or ionizing radiation

Who is at risk for NTM infection?

These opportunistic bacteria affect individuals with pre-existing conditions. Specifically, patients with underlying lung disease, immunosuppression, or HIV are at an increased risk for infection. Since NTM infection is not a reportable disease in the United States, the exact prevalence of infections is not known.

What is the clinical manifestation of infection?

Symptoms may present as those similar to tuberculosis and may include: cough, fever, night sweats, hemoptysis, and weight loss. Lung infection is usually more chronic and less invasive than that of tuberculosis.

How is infection confirmed?

Infection by NTM primarily affects the lungs; however, it can affect all organs of the body. Multiple isolation of NTM from respiratory specimens on more than one occasion may be indicative of infection. Additionally, laboratory testing and diagnosis can biochemically confirm the bacteria.

Is infection difficult to treat? What treatment is available?

Combinations of anti-mycobacterial antibiotics are necessary and clarithromycin and quinolones are sometimes used.

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