



*Environmental  
Safety  
Technologies*

# *Legionella*



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# LEGIONELLA

## DID YOU KNOW...

Of the 2.4 million cases of pneumonia that occur each year in the United States, an estimated 10,000 to 25,000 are actually cases of Legionnaires' disease; 5-15% fatal.

Since October 2005 over \$800 million has been awarded by juries in Legionellosis cases, with several hundred million dollars more pending.

The diagnosis of Legionellosis requires special tests not routinely performed on persons with fever or pneumonia and standard first line antibiotic prescriptions are not generally effective against Legionellosis.

Outbreaks of Legionellosis have occurred after persons have inhaled aerosols that come from a water source (i.e. air conditioners, cooling towers, whirlpool spas, showers, sinks and bathtubs) contaminated with the bacteria, *Legionella pneumophila*.

Consistent routine testing of water systems is the best defense against Legionnaires' disease outbreaks.



## GENERAL INFORMATION

*Legionella* are small rod-shaped bacteria, with over 40 known individual species. The majority of human infections are caused by the species *Legionella pneumophila*. *Legionella pneumophila* was first discovered following a pneumonia outbreak at the 1976 Philadelphia Convention of the American Legion.

In addition, seven other species have been associated with disease.

## ENVIRONMENTAL ECOLOGY:

*Legionella* are found in most environmental water sources including groundwater, fresh and marine surface water, and even potable water.

*Legionella* are protected against standard water disinfection techniques by their symbiotic relations with other microorganisms.

These bacteria have been found in water distribution systems of hospitals, hotels, ships, public buildings, homes, and commercial facilities. Other water sources in which *Legionella* have been found include cooling towers, evaporative condensers and whirlpools.

Water from faucets, showerheads, cooling towers, spas, and nebulizers may be aerosolized and then inhaled into the lungs, causing Legionnaires' disease.



## Nationally Recognized LEGIONELLA Expert

**Dr. Richard Miller**, Vice-President, Co-founder and Director of Laboratory Services  
*Environmental Safety Technologies*



35 years of research experience in various areas of microbiology; *Legionella* and Legionnaires' disease being his main focus. For the past 29 years Dr. Miller has served as a faculty member in the Department of Microbiology and Immunology at the University of Louisville, School of Medicine. His research has yielded in the publication of more than 75 articles and 80 abstracts, contributing to the knowledge of the physiology and metabolism of *Legionella*, its virulence factors and mechanisms of disease pathogenesis, and understanding the prevalence and control of *Legionella* in cooling towers and whirlpool spas.

He is the co-author of the U.S. patent for the use of polymerase chain reaction (PCR) to identify *Legionella* from environmental water samples. As a result of his *Legionella* expertise, he has been invited to speak on *Legionella* at events and locations throughout the world.

He continues to be an active member of the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) serving on the committee (GPC-12) for preparing the Guideline on Minimizing the Risk of Legionnaires' Disease Associated with Building Water Systems (Guideline 12-2000), ASHRAE Technical Committee 3.6 (Water Treatment) and the Environmental Health Committee. Most recently he has accepted an invitation to serve on the new Standard Committee (SPC-188) to upgrade the *Legionella* Guideline to Standard Practice for the building water system industry.

## OUTBREAKS:

Cases of Legionellosis (any disease caused by *Legionella*) have been reported in North and South America, Asia, Australia, New Zealand, Europe and Africa.

National surveillance programs are conducted in the United States and 24 European countries.

Outbreaks in hospitals have been linked to hospital potable water supplies, air conditioning systems, and cooling towers.

Travelers can be exposed to *Legionella* in contaminated potable water, contaminated whirlpool spas, or nearby cooling towers. (i.e. Hotels, Cruise Ships)

Community outbreaks are caused by exposure to a wide variety of sources, the most common being potable water and cooling towers.

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## RISK FACTORS

The general population (healthy individuals) are fairly resistant to *Legionella* infections.

However, certain groups are at a higher risk for contracting Legionnaires' Disease, including:

- Hospital patients requiring intubation, receiving ventilation assistance or respiratory therapy, individuals taking immunosuppressive drugs.
- People with certain chronic health conditions (chronic obstructive pulmonary disease, diabetes, head or neck cancer, or end-stage kidney disease)
- Heavy smokers or drinkers



These individuals are at a higher risk of severe illness and increased mortality upon exposure to *Legionella*.



## TRANSMISSION:

*Legionella* are transmitted directly from environment to humans.

There is no evidence of human-to-human or animal-to-human transmission of these bacteria.

Potable water and cooling towers are the most important sources of *Legionella*.

Humans may inhale contaminated aerosols or aspirate small amounts of contaminated drinking water.

No vaccine is available to prevent infection.

## ADDITIONAL INFORMATION

Environmental Safety Technologies  
[www.estechlab.com](http://www.estechlab.com)

American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)  
[www.ashrae.org](http://www.ashrae.org)

Environmental Protection Agency (EPA)  
[www.epa.gov](http://www.epa.gov)

Centers for Disease Control (CDC)  
[www.cdc.gov](http://www.cdc.gov)

Joint Commission (JCAHO)  
[www.jcaho.org](http://www.jcaho.org)

## WATER TREATMENT

Control methods for cooling towers utilize biocides approved for general microbial control.

The best *Legionella* control uses two different biocides:

- ◆ Oxidizing
- ◆ Non-oxidizing

Control methods for water distribution systems include:

- ◆ Thermal (super heat and flush)
- ◆ Chlorine dioxide
- ◆ Copper-silver ionization
- ◆ Hyper chlorination
- ◆ Instantaneous steam heating
- ◆ Ozonation

**Periodic *Legionella* monitoring is required to verify effectiveness.**

## ANALYTICAL METHODS

Environmental samples should be collected as either water samples or swabs taken from areas where water flows (such as faucets and shower heads). Potable water specimens should be concentrated by filtration. To enhance *Legionella* recovery, samples are cultured on a selective buffered charcoal yeast extract (BCYE) agar medium with and without antibiotics. Culture assays are the most common tests used to detect *Legionella* in environmental samples. Rapid PCR methods are also available, although culture remains the "gold standard" for *Legionella* analysis.



## REGULATORY INFORMATION

EPA has established a Maximum Contamination Level Goal (MCLG) of zero organisms for drinking water.

ASHRAE Guideline 12-2000, "Minimizing the risk of Legionellosis Associated with Building Water Systems" is the most comprehensive and recognized guideline document.

## ENVIRONMENTAL LABORATORY ANALYSES

### ***Legionella* Culture and Direct Fluorescent Antibody (DFA)**

These tests provide a total heterotrophic bacterial count and *Legionella* bacteria count, both viable (via culture) and nonviable (via DFA). Identification of isolates as *Legionella pneumophila* Serogroup 1, 2-14, or species (b-p).

**Turnaround: 7-10 Business Days**



## COMPREHENSIVE *LEGIONELLA* SERVICES

- On site testing (including emergency response)
- Development of test kits and training (for self-testing if desired)
- Complete laboratory analysis
- Personalized risk assessments
- PhD Microbiologist Recommendations



# Certified Healthcare Contractor



