



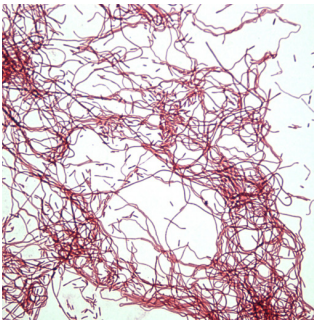
Legionella

Background

Legionella species are a ubiquitous, Gram-negative genera of bacteria found in a variety of environments. Legionella species are commonly isolated from soil, lakes and streams, but are also found in such manmade structures as cooling towers, hot tubs and water fountains. Legionella spp. are the causative agent of legionellosis which can be further subdivided into Legionnaires' disease and Pontiac fever. There are currently over 50 species of Legionella and over 70 different serotypes. *Legionella pneumophila* is the most common cause of legionellosis (~90%) and is further grouped into specific serogroups, with serogroup 1 being the most prominent¹.



Legionella pneumophila



Legionella pneumophila serogroup 1

Legionellosis was first diagnosed in 1976 at a convention of the American Legion in Philadelphia where there were 182 cases and 29 deaths. In 2001, there was a Legionella outbreak in Toronto at an old age home that resulted in 135 cases of legionellosis and 21 deaths. More recently in Quebec City there was an outbreak in 2012, with 181 cases and 14 deaths^{2,3,4}. This latter outbreak has resulted in much stricter regulations in the province of Quebec. It is commonly understood that the number of Legionnaires' cases are higher than those reported as most cases are likely diagnosed as "non-specific pneumonia" rather than legionellosis. Even though this misdiagnosis commonly occurs, between 2009-2013, the number of legionellosis cases in Ontario increased on average 39.2% year over year⁵.

Sources

Legionella is most notably known to amplify in cooling towers but it can also be found in hot tubs, decorative fountains, potting soil, shower heads, condensers and humidifiers. Growth in these structures can occur as a biofilm making control difficult. Control of Legionella growth involves the development of a Legionella Bacteria Control Management Program (LBCMP). This program includes documenting areas that might have potential for Legionella growth, maintaining monitoring records, training of employees, and a remedial action plan if Legionella amplification does occur.



Legal Requirements

Currently there are no Ontario regulations pertaining specifically to the control and testing of Legionella in water systems. However, the Occupational Health and Safety Act, Section 25(1)(a) & (b) states that employers have a duty to ensure that equipment, materials and protective devices provided are maintained in good shape. Section 25(2)(h) further requires employers to take all reasonable precautions to protect workers. Protecting workers from Legionella exposure falls under these general requirements.

In 2013, Public Works and Government Services Canada (PWGSC) published the standard, *MD15161-2013 Control of Legionella in Mechanical Systems*. This protocol provides the minimum requirements for the design, operation, maintenance and testing to prevent legionellosis associated with building water systems in federal buildings. The document was developed in consultation with specialists and engineering professionals and by review of industry regulations as well as the Quebec regulations for cooling towers.



Legionella



Sampling

Container: 1L plastic HDPE with sodium thiosulphate preservative

Shipping: transport samples less than 18°C but not less than 6°C. Protect from heat and UV

Hold Time: 48hrs but the sooner we receive the sample the better, ideally within 24hrs

Testing

The laboratory analysis for Legionella predominantly involves culturing the water samples on specialized culture media. While other methods are available (e.g. qPCR), the culturable method is recognized as the gold standard for detection of Legionella in environmental samples. Paracel follows the ISO 11731 method for analysis of legionella as required by PWGSC Standard *MD15161-2013 Control of Legionella in Mechanical Systems*. Water samples are cultured on a selective media (GVPC) that aids in the recovery of Legionella amongst the other microflora found in the sample. This procedure takes almost 2 weeks due to Legionella spp's slow growth in culture. Data are reported as CFU/mL, or colony forming units per milliliter of water, and sub-divided into 3 groups: *Legionella pneumophila* serogroup 1, *Legionella pneumophila* serogroup 2-14 and Legionella spp.

Accreditation and Certification

- Paracel is accredited to ISO 17025:2005 by the Canadian Association for Laboratory Accreditation (CALA) for Legionella analysis
- ELITE certification: Paracel has received a Certificate of Proficiency from the ELITE Program for Legionella analysis from the Centre for Disease Control in Atlanta

References

¹ Marston, B. J., H. B. Lipman, and R. F. Breiman. 1994. Surveillance for legionnaires' disease. Risk factors for morbidity and mortality. Arch. Intern. Med. 154:2417-2422.

² Fraser, D. W., T. R. Tsai, W. Orenstein, W. E. Parkin, H. J. Beecham, R. G. Sharrar, J. Harris, G. F. Mallison, S. M. Martin, J. E. McDade, C. C. Shepard, and P. S. Brachman. 1977. Legionnaires' disease: description of an epidemic of pneumonia. N. Engl. J. Med. 297:1189-1197.

³ Ontario Ministry of Health and Long Term Care. 2005. Report Card: Progress in Protecting the Public's Health Report of the Expert Panel on the Legionnaires' Disease Outbreak.

⁴ Trudel, L., Veillette, M., Bonifait, L., and C. Duchaine. 2014. Management of the 2012 Legionella crisis in Quebec City: need for a better communication between resources and knowledge transfer. Front Microbiol. 2014; 5: 182.

⁵ Public Health Ontario. May 2014. Monthly Infectious Disease Surveillance Report.