

Legionella antigen testing in water systems

Expert Opinion of Professor T H Pennington

This report has been prepared at the request of Albagaia Ltd., Pinnacle House, Mill Road Industrial Estate, Linlithgow, EH49 7SF.

Professional credentials

I am Professor of Bacteriology (Emeritus), University of Aberdeen. I am a medical graduate (University of London), a registered medical practitioner, and a Fellow of the Royal College of Pathologists. In 1996-97 I chaired an inquiry for the Government into the Central Scotland *E.coli* O157 food poisoning outbreak. I chaired the Public Inquiry into the South Wales *E.coli* O157 outbreak which reported in 2009. I was appointed CBE in 2013 for services to microbiology and food hygiene, and am a Fellow of the Royal Society of Edinburgh, a Fellow of the Academy of Medical Sciences, and a Fellow of the Royal College of Physicians of Edinburgh.

1. *Legionella* is the second commonest cause in the UK of community-acquired pneumonia requiring intensive care. Infections caused by it have a high mortality; 10.6% of the 4036 cases diagnosed in England and Wales in the years 2000-2011 had a fatal outcome. Individuals particularly at risk are cigarette smokers, alcoholics, diabetics, those with chronic illnesses, and those receiving corticosteroids or immunosuppressive therapy.
2. Many *Legionella* species have been described but the principal cause of human infections is *L.pneumophila*; more than 80% of cases in the UK have been caused by serogroup 1 of this species..
3. The clinical diagnosis of a *Legionella* infection is not straightforward; it has no unique pattern allowing its differentiation from other commoner causes of pneumonia. Important clues are a severe illness with multisystem involvement associated with the failure to culture a bacterial pathogen from the sputum using routine methods and a lack of response to beta-lactam antibiotics. The isolation of *Legionella* by culture is slow and relatively insensitive. Its main value is epidemiological; the fingerprinting of isolates can be of great assistance in tracking the source of the organism in outbreaks. The British Thoracic Society Guidelines (Thorax, 2009, 64 (Suppl III) recommend that a *Legionella* urine antigen test be performed for all patients with high severity community acquired pneumonia.
4. Many individuals in the UK belong to the groups that are at high risk for developing a serious and high mortality *Legionella* infection. The prevention of infection must therefore be given the highest priority, primarily the prevention of aerosol spread from artificial water systems. The efficacy of control measures is monitored by testing for *Legionella* in such waters. Quantitative measurements based on culture can be done by culture using the method described in the International Standard ISO 11731. However, culture by its very nature is slow to give results and only detects viable organisms.
5. In my opinion, the same philosophical reason underpins the requirement for rapid results indicated in the Guidelines for clinical testing as the one which should govern the testing of managed waters which might contain *Legionella*. It is that immediate

action should follow the receipt of positive results.

6. Urine antigen testing is particularly useful in the clinical setting because of its intrinsic speed, aided very significantly by the lack of a requirement for specimen transport to a distant laboratory. Its low cost means removes an important impediment to frequent testing.
7. *Legionella pneumophila* serogroup 1 antigen tests are available. While it is for the manufacturers of these tests to demonstrate that their sensitivity and specificity under field conditions are satisfactory (I would consider equivalence in these regards to urine test kit results to be appropriate), in my opinion if such properties obtain their advantages over culture in terms of speed and cost are such that I strongly support their incorporation as an adjunct to culture in any Guidance regarding the control of *Legionella* in water systems.



Professor T H Pennington

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