

# LEGIONNAIRES' DISEASE

- There are 350–400 confirmed cases of Legionnaires' disease annually in the UK; but this may be a significant underestimate.
- The causative agent is a bacterium that grows in warm water.
- Careful maintenance of cooling towers and hot and cold water systems is vital in preventing outbreaks.

## OVERVIEW

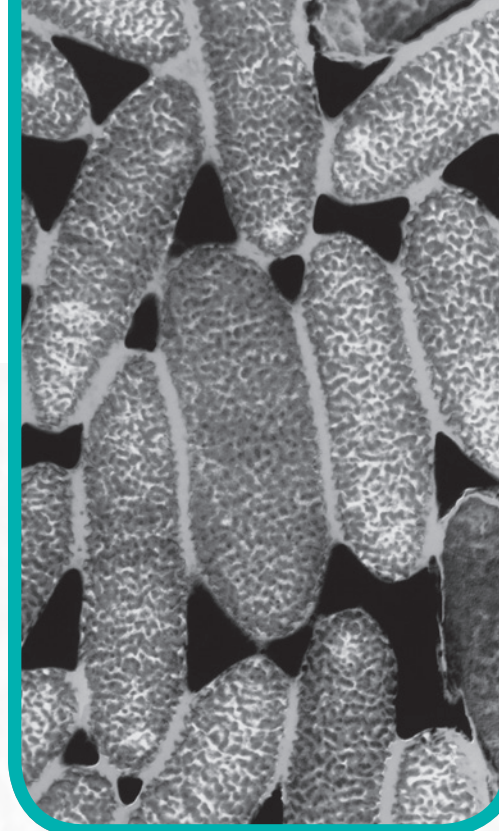
Legionnaires' disease is an infection caused by the *Legionella* bacterium. The bacterium infects the lungs, triggering a cough, fever, chest pain and pneumonia. The bacterium grows in warm, slow-moving water in poorly maintained plumbing systems and is spread when the water becomes agitated, creating a bacteria-laden aerosol. Inhalation can lead to infection and disease. Treatment is via antibiotics; prevention relies on careful maintenance of plumbing systems. Person-to-person transmission has never been documented.

## SCALE OF THE PROBLEM

The UK health authorities have collected data on the rate of Legionnaires' disease since 1980. These data indicate that the disease is uncommon – accounting for 350–400 confirmed cases annually and, tragically, a handful of deaths.<sup>1</sup>

However, it is important to realise that the number of confirmed cases is probably an underestimate by at least 15 times, as doctors may diagnose the disease generically as 'pneumonia' and treat it with antibiotics, rather than pinning down the exact cause.<sup>2</sup>

Reported cases of Legionnaires' disease in England and Wales gradually increased between 2000 and 2005; following a peak in 2006, numbers have since stabilised.<sup>3</sup> The increase was probably



Legionella pneumophila – Barry Dowsett / Science Photo Library

due to improved diagnostic testing rather than a real effect and should not therefore be seen as alarming.

Over the past decade there have been about 40 'outbreaks', i.e. two or more cases clustered in the same area and connected to the same source of infection.<sup>4</sup> The largest UK outbreak – 170 confirmed cases – occurred in 2002 in Barrow-in-Furness, linked to a contaminated cooling tower at the town's arts centre. There were recent outbreaks in Edinburgh and Stoke-on-Trent which affected 122 people and, sadly, killed five.<sup>5</sup>

Antibiotics clear up the infection, but mortality rates in recent years have still ranged from 8 to 12%. Epidemiological studies indicate that 'at-risk' groups include those over 45 years old, smokers, alcoholics, diabetics and individuals with heart disease, cancer or chronic respiratory or kidney disease. Men are more likely to succumb than women.<sup>6</sup> Hospital-acquired infections are twice as likely to lead to death as infections acquired outside hospital.<sup>7</sup>

## RISK FACTORS

The *Legionella* bacterium grows in warm water. Hotspots include cooling towers attached to buildings, spa pools/hot tubs, showers, humidifiers and indoor fountains. The disease is spread through inhalation of *Legionella*-laden water droplets. Hence, there must be an agitating mechanism that generates an aerosol.

Legionnaires' disease outbreaks are most likely in the summer months between July and September when the weather is warmer and more humid.<sup>8</sup> Between 30 and 40% of cases in the UK are 'travel-associated' which means that travel abroad is a risk factor.<sup>9</sup>

## PREVENTION

The law holds owners and operators responsible for the *Legionella* risk at their facility. This means a factory owner, spa operator or hospital manager must ensure systems and processes are in place to prevent outbreaks.

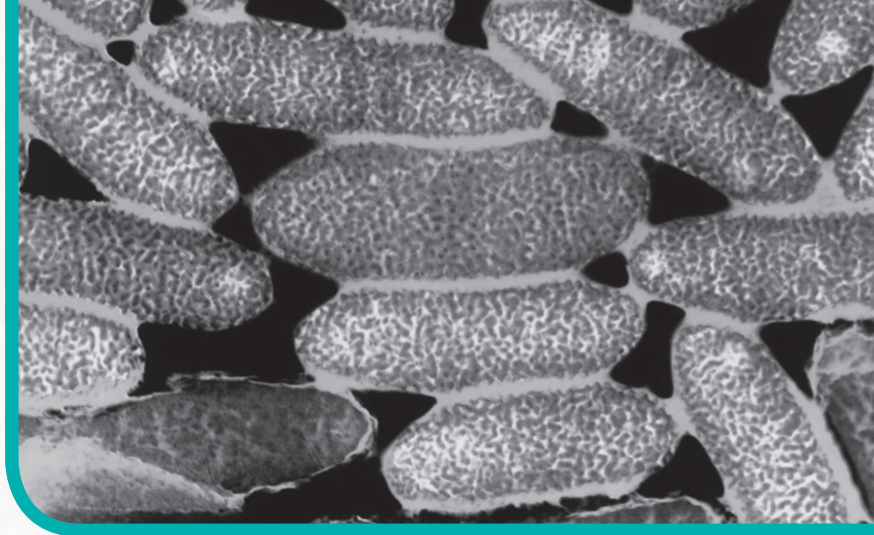
A 'code of practice' requires operators to check for risk factors such as warm water stagnating in pipes and tanks, and to design and enforce a standard operating procedure for *Legionella* prevention.<sup>10</sup>

Working on behalf of facility owners, over 250 registered private contractors nationwide clean and maintain pipes, air-conditioners and other machines that might harbour the bacterium.<sup>11</sup> Regular checks aim to reduce the number of *Legionella* bacteria to zero.

The majority of outbreaks have been due to the lack of a standard operating procedure, rather than failings in implementing it.<sup>12</sup> A 2003 report from the Health and Safety Executive emphasised the need for an awareness-raising campaign covering offices, industrial premises and care homes – with particular attention paid to small business owners who may not understand the danger.<sup>13</sup>

## DETECTING THE BACTERIUM

The *Legionella* urinary antigen test is commonly used to identify the bacterial infection in



people. NHS Trust laboratories have the capacity to feedback results within hours using a commercially available rapid test kit.<sup>14</sup>

Microbiologists can detect and categorise *Legionella* bacteria using molecular testing and typing methods and by growing samples in the laboratory.

Water samples from plumbing systems need to be 'enriched' artificially in the laboratory before testing. The DNA can then be extracted and tested to confirm the exact bacterial type. The United Kingdom Accreditation Service accredits about 50 specialised laboratories in the government, private and university sectors for this work.<sup>15</sup>

There is another layer of water testing that does not require specialised laboratories, but is less definitive.<sup>16</sup> Plastic 'dip slides' are dipped into the water and incubated for 48 hours. If bacteria grow on the slides, then further tests are needed.

## INVESTIGATING AN OUTBREAK

Since 2010, Legionnaires' disease has been 'notifiable' throughout the UK which means that medical practitioners must inform their local authority if they encounter cases. The local authority, in turn, notifies the Health Protection Agency (HPA) in London.

The investigative response lies in the hands of microbiologists and epidemiologists from the HPA and from local authorities who work collectively to identify the cause of the outbreak and stop it. Outbreak investigators have powers to take samples, mandate cleaning and close down facilities.<sup>17</sup>

If the bacterium isolated from patients genetically matches the bacterium in the water sample, the source of the outbreak is considered found.

*Details of references cited in this briefing can be found at [www.sgm.ac.uk/news/hot\\_topics/Legionnaires-references.pdf](http://www.sgm.ac.uk/news/hot_topics/Legionnaires-references.pdf).*

## SGM BRIEFINGS

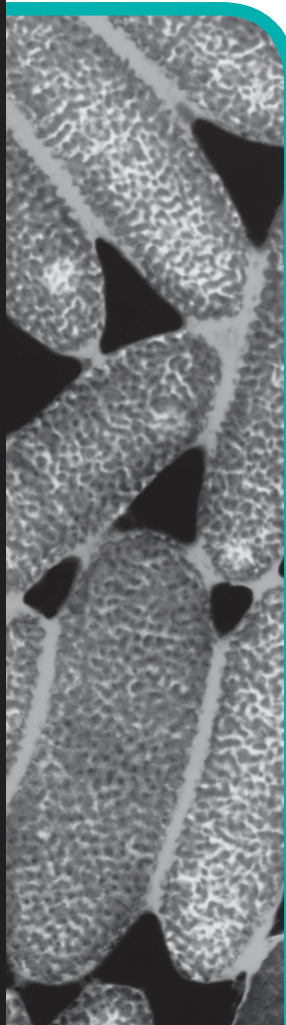
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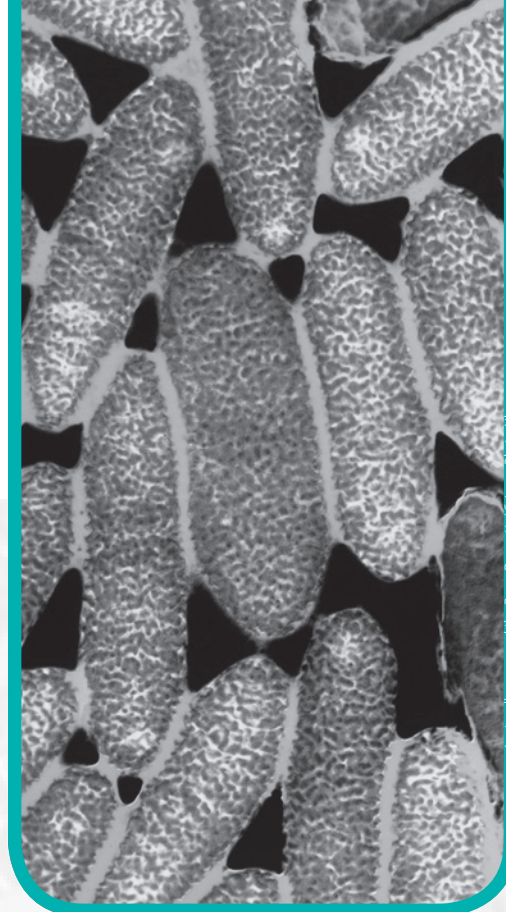
*Thanks are due to Professor Nick Phin, Health Protection Agency, for his helpful comments on the text.*

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# LEGIONNAIRES' DISEASE – REFERENCES



Legionella pneumophila - Barry Dowsett / Science Photo Library

## REFERENCES

- <sup>1</sup> Phin, N., McLean, E., Naik, F.C., Zhao, H. & Harrison, T. (2012). Respiratory supplement: Legionnaires' disease in England and Wales, 2008–2010. *Health Protection Report* 6, no. 9, 2 March 2012, unnumbered pages. <http://bit.ly/Vx1v5B>
- <sup>2</sup> Phin *et al.* *ibid.* & Joseph, C., Paranthaman, K. & Naik, F. (2010). *Guidance on the Control and Prevention of Legionnaires' Disease in England. Technical Paper 1 – Disease Surveillance*. Health Protection Agency, pp. 16–17.
- <sup>3</sup> Phin *et al.* *ibid.*
- <sup>4</sup> Anon. (2012). *Legionella* outbreaks and HSE investigations; an analysis of contributory factors. HEX/12/07. Health and Safety Laboratory, p. 3.
- <sup>5</sup> NHS Lothian (2012). Press Release. *Outbreak of Legionella in South West Edinburgh. Update – 18/07/2012*. <http://bit.ly/RIOE1C> & Health Protection Agency (2012). Press Release. Update 17 August: *Legionnaires' disease in Stoke-on-Trent*. <http://bit.ly/QkeH99>
- <sup>6</sup> Phin *et al.* *ibid.*
- <sup>7</sup> Phin *et al.* *ibid.*, Table 6.
- <sup>8</sup> Ricketts, K.D., Charlett, A., Gelb, D., Lane, C., Lee, J.V. & Joseph, C.A. (2009). Weather patterns and Legionnaires' disease: a meteorological study. *Epidemiol Infect* 137, 1003-1012.
- <sup>9</sup> Phin *et al.* *ibid.*, Table 6.
- <sup>10</sup> Health and Safety Executive (2000). *Legionnaires' disease: The control of Legionella bacteria in water systems. Approved Code of Practice and Guidance*, p. 7.
- <sup>11</sup> SGM estimate based on August 2012 data in: *Legionella Control Association. Directory of Companies*. <http://bit.ly/RigVvc>
- <sup>12</sup> Anon. (2012). *ibid.*, p. 6.
- <sup>13</sup> Anon. (2003). *Evaluation of HSC's ACOF and Guidance 'Legionnaires disease: Control of Legionella bacteria in water systems (L8)'*. *Research Report 140*. BRE Environment for the Health and Safety Executive, p. iv.
- <sup>14</sup> e.g. North Devon Healthcare NHS Trust (2012). *Turnaround Times – Microbiology*. <http://bit.ly/QhUSot>
- <sup>15</sup> SGM estimate based on August 2012 data in: *UKAS testing laboratory website. Single Test Search*. <http://bit.ly/NfNesX>
- <sup>16</sup> Health and Safety Executive, *ibid.*, p. 19.
- <sup>17</sup> Health and Safety Executive, *ibid.*, p. 60.

