Brief Report

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A Report on *Legionella pneumophila*

Ross Cameron

Department of Microbiology, Molecular Biology Institute, University of Edinburgh, Edinburgh, Scotland, UK

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***Corresponding author:** Ross Cameron

Department of Microbiology, Molecular Biology Institute, University of Edinburgh, Edinburgh, Scotland, UK.

RossCameron682@gmail.com

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Brief Report

Legionella pneumophila is a gram-negative, thin, aerobic, pleomorphic, flagellated, non-spore-forming bacterium of the genus *Legionella*. The primary human pathogenic bacterium in this group is *Legionella pneumophila*, which is the causative agent of Legionnaires' disease, also known as legionellosis. *Legionella pneumophila* infects freshwater and soil amoebae of the genera Acanthamoeba and Naegleria in nature. The mechanism of infection in amoeba and human cells is similar.

While *Legionella pneumophila* is classified as a gram-negative organism, it stains poorly due to the presence of lipopolysaccharides in the outer leaflet of the outer cell membrane. The bases for this organism's somatic antigen specificity are found on the side chains of its cell wall. The nature of the somatic or O-antigenic determinants, which are important means of serologically classifying many Gram-negative bacteria, is determined by the chemical composition of these side chains, both in terms of components and arrangement of the different sugars. At least 35 different *Legionella pneumophila* serovars have been described, and several other species have been subdivided into a number of serovars as well.

Sera have been used for slide agglutination studies as well as direct detection of bacteria in tissues via immunofluorescence using fluorescent-labeled antibodies. The indirect fluorescent antibody test can identify specific antibodies in patients. Micro-agglutination and ELISA tests have also been developed. Legionella stains poorly with Gram stain, positively with silver stain, and grows well on charcoal yeast extract containing iron and cysteine.

Legionella pneumophila is a facultative intracellular parasite that can invade and replicate inside amoebae in the environment, particularly *Acanthamoeba* and *Naegleria* species, which can thus serve as a reservoir for *Legionella pneumophila*. These hosts also protect against environmental stresses like chlorination. Legionella has been shown to proliferate in biofilms on the walls of pipes. Sloughed legionella from biofilms in plumbing systems can be aerosolized through faucets, showers, sprinklers, and other fixtures, resulting in infection after long-term exposure.

Legionella pneumophila invades and replicates inside macrophages in humans. The presence of antibody and complement can improve bacterial internalisation, but it is not required. Phagocytosis appears to be the mechanism by which bacteria are internalised. However, *Legionella pneumophila* can also infect non-phagocytic cells via an unknown mechanism. Coiling phagocytosis has been described for *Legionella pneumophila*, but it is not dependent on the Dot/Icm (intracellular multiplication/defect in organelle trafficking genes) bacterial secretion system and has been observed in other pathogens. When bacteria are internalised, they surround themselves in a membrane-bound vacuole that does not fuse with lysosomes, which would otherwise degrade the bacteria. Bacteria multiply in this protected compartment.

Legionella uses seven amino acids as auxotrophs: cysteine, leucine, methionine, valine, threonine, isoleucine, and arginine. Legionella requires nutrients to grow and reproduce once inside the host cell. Nutrient availability is low inside the vacuole; the high demand for amino acids is not met by the transport of free amino acids found in the host cytoplasm. To increase the availability of amino acids, the parasite encourages the host's proteasomal degradation mechanisms. This results in an excess of free amino acids in the cytoplasm of *Legionella pneumophila* -infected cells, which can be used for intravacuolar parasite proliferation.

The standard treatment for Legionella pneumonia in humans is either macrolides (azithromycin or clarithromycin) or fluoroquinolones (levofloxacin or moxifloxacin), with levofloxacin considered first line due to increasing resistance to azithromycin. Despite the fact that levofloxacin is not FDA approved, two studies support its superiority over macrolides.