



# Legionnaires' Disease

## Appendix I:B. Diagnostic Methods

The following diagnostic methods confirm the presence of Legionnaires' disease:

- [Culture of the organism](#)
- [Detection by means other than culture](#)
  - [Serology \(antibody titers\)](#)
  - [Direct fluorescent antibody \(DFA\) staining](#)
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### Culture of the organism:

- The definitive laboratory method of confirming the presence of the bacterium is by culturing, on special media, viable cells of Legionnaires' disease bacteria (LDB) from sputum, a bronchial washing, or autopsy tissue.
- Further identification of the cultured bacteria will identify the species and serogroup. Special tests may determine the subtype of certain isolates.
- The sensitivity of this test to detect the disease is reported to be about 70 percent.

### Detection by means other than culture:

#### • Serology (antibody titers):

- An increase in the antibody level in the blood of infected persons occurs several weeks after the onset of the disease.
- The treating physician compares the antibody level four to eight weeks after onset (convalescent titer) to an initial (acute) titer at the beginning of the disease.
- A four-fold increase in the antibody titer coupled with a physician's diagnosis of pneumonia is considered a reliable indicator of disease.
- Pontiac fever also produces an elevated antibody titer, but the flu-like symptoms of this disease do not match those of Legionnaires' disease.

#### • Direct fluorescent antibody (DFA) staining:

- Direct fluorescent antibody staining of lung aspirates or sputum can detect *L. pneumophila*.
- This test is frequently negative during the initial stages of the disease because few organisms are present in the aspirate or sputum.
- This test also requires an antigen-specific reagent. There are a multitude of serogroups and subtypes of *L. pneumophila* as well as other species of *Legionella*, and a test will be negative if the exact antigen-specific reagent is not included.

#### • Urine Antigen Test:

- The detection of antigens from *L. pneumophila* in an infected person's urine is considered a reliable measure of the disease.

- The presence of antigen in the urine is a strong indicator of the disease, and a patient may have a positive response for several months following the disease.
- The sensitivity of this test is limited because the only commercially available urinary antigen test detects only serogroup 1 forms of *L. pneumophila*. Fortunately, 80-90 percent of the clinically diagnosed cases are caused by serogroup 1.
- The Centers for Disease Control and Prevention (CDC) recommends the radioimmunoassay (RIA) or enzyme-linked immunosorbent assay (EIA) because the latex antigen (LA) test may incorrectly identify the presence of antigen when in a person without Legionnaires' disease.
- The absence of a positive urinary antigen test is not proof that a patient does not have Legionnaires' disease but merely indicates the absence of antigen in the urine at the time of the test.

**Additional considerations:**

- Frequently, only a convalescent titer has been measured from individuals who have symptoms of the disease. For situations in which these cases are associated with an outbreak of Legionnaires' disease, a single titer of 256 to 1 or higher is generally used as a presumptive indication of disease. Antibody strength is determined by the number of dilutions of serum that elicit a positive antibody response. The reciprocal value of the number of dilutions is the antibody titer. For example, an antibody titer of 256 means a positive antibody test of the patient's serum following serial dilutions of 1:2, then 1:4, then 1:16, etc., until the 1:256 dilution point is reached.
- The indirect fluorescent antibody (IFA) test is the accepted serological diagnostic tool for demonstrating *L. pneumophila* exposure. Another widely used test of antibody response is the enzyme-linked immunosorbent assay (ELISA) method. CDC believes that direct comparison of results between IFA and ELISA is not reliable because there is insufficient data supporting the comparison of the two. However, the ELISA method has gained wide medical acceptance as a useful means of demonstrating exposure to *Legionella* and positive results should be confirmed with an IFA test.

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