

Legionellosis

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Learning Objectives

1. Know the difference between Legionnaires' Disease and Pontiac Fever
2. Identify high risk groups
3. List appropriate prevention and control measures



CDC 1976 <http://phil.cdc.gov/phil/home.asp>

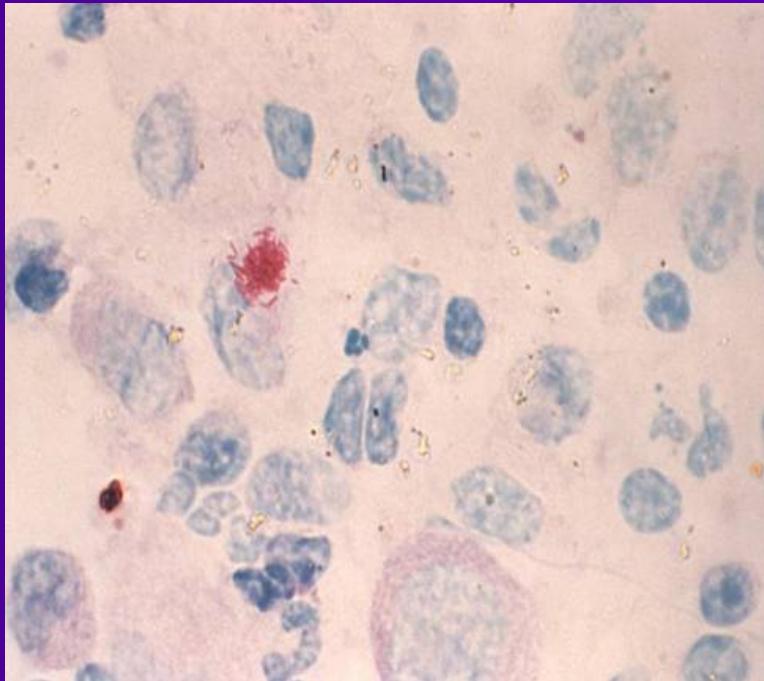
Legionnaires' Disease



Legionellosis

- *Legionella spp*
- *Legionella pneumophila*
 - Causative agent of most cases of
 - Legionnaires' Disease-pneumonia
 - Pontiac Fever-flu like illness
 - Implicated in wound infections, pericarditis and endocarditis

Legionella pneumophila



Legionnaires' Outbreak, Philadelphia

Cluster of Gram negative *L. pneumophila* bacteria within a pulmonary tissue sample from a 1976 case

<http://phil.cdc.gov/phil/home.asp>

Legionella pneumophila

An Intracellular Organism



Legionella live, grow and reproduce within amoeba and other protozoa.

Legionella pneumophila chains within two ciliated protozoa
Tetrahymena pyriformis

CDC D Howard 1984

Legionella pneumophila

- Intracellular bacterial parasite
- Grows in protozoa in nature and tissue macrophages in humans (18 serogroups)
- Serogroup 1 comprises 80-90% of clinically diagnosed cases
- Serogroups 4 and 6 follow

Legionella pneumophila

- Identified in 1977 as the cause of Legionnaires' Disease
- Difficult to culture

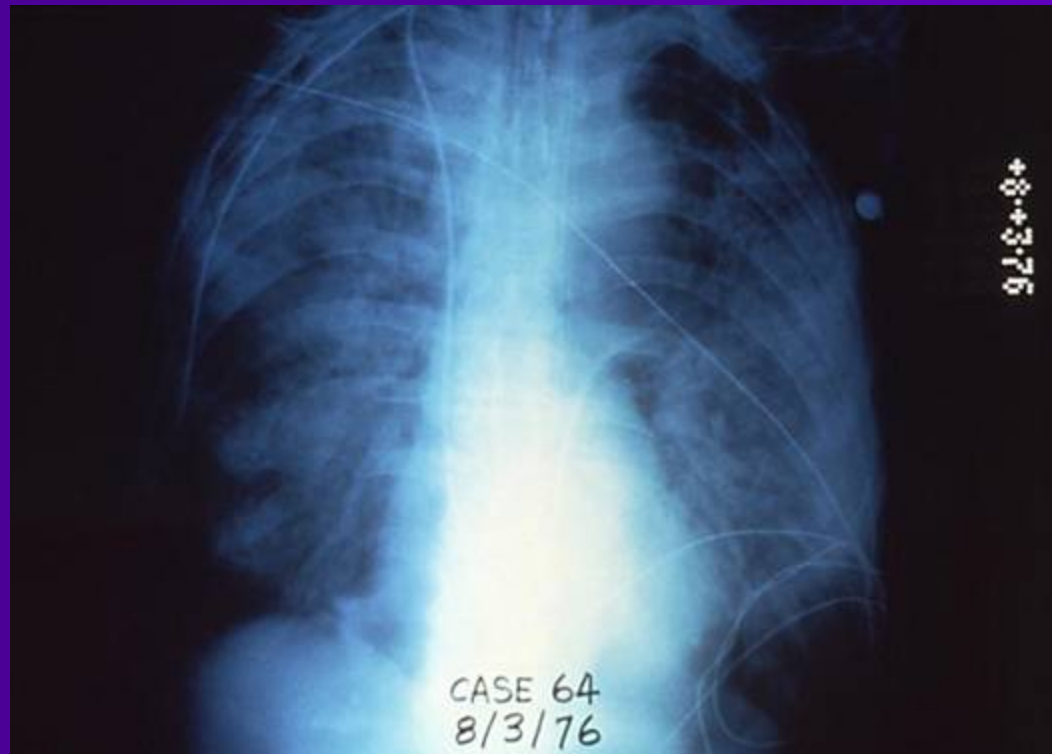
Legionellosis

Legionnaires' Disease

Legionnaire Pneumonia

- Incubation Period: 2-10 days;
most often 5-6 days
- Chills, nonproductive cough, abdominal pain, nausea, vomiting & diarrhea are common
- Clinical or radiographic pneumonia
- Case fatality rate about 10-15%

Legionnaires' Disease



**Anteroposterior
CXR**

Bilateral
pulmonary
infiltrates in a
1976 outbreak
victim

CDC 1976

<http://phil.cdc.gov/phil/home.asp>

Pontiac Fever

Non-pneumonic Legionellosis

- Incubation Period: 5-66 hrs;
most often 24-48 hours
- Same initial symptoms
- Not associated with pneumonia or death
- Recover spontaneously without treatment
- May represent response to inhaled Legionella antigens instead of bacterial invasion

Legionella pneumophila

Communicability

- Primarily airborne
- Other modes possible
- Person-to-person transmission has not been documented
- No outbreaks associated with swimming in rivers, lakes, or other natural bodies of water

Susceptibility/Risk Factors

- Older age
- Usually male
- Usually has chronic disease
- Malignancy (solid and leukemia)
- **Immunocompromised** (HIV/AIDS, chemo, organ transplant, immunosuppressants, corticosteroids)

Laboratory Testing

- Culture of *L. pneumophila*/other *Legionella* spp
- Urine antigen test
- Direct Fluorescent Antibody (DFA)
- Serology (Antibody titers)

Legionella Culture



**Legionella
colonies**

Agar plate
UV illumination

CDC J Gathany 2005

<http://phil.cdc.gov/phil/home.asp>

Legionella Culture



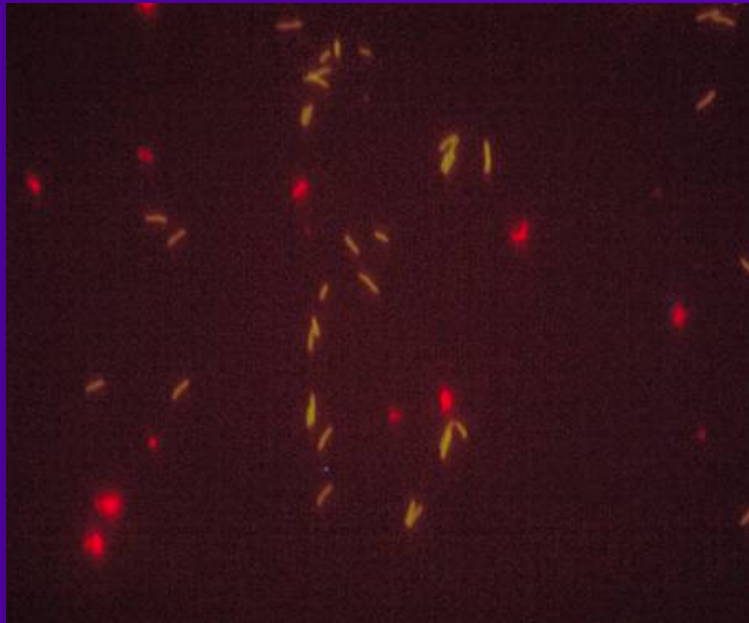
L pneumophila
Charcoal-Yeast
extract

Agar plate
36 degrees C

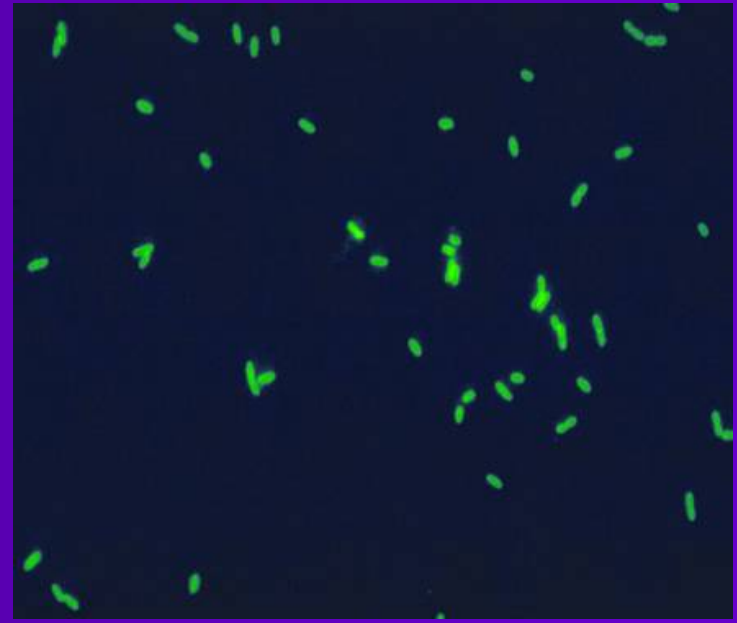
CDC J Feeley 1978

<http://phil.cdc.gov/phil/home.asp>

Legionella pneumophila



Indirect FA 400x
CDC WK Harrell 1978



Direct FA Mag 400x
CDC W Cherry 1978

<http://phil.cdc.gov/phil/home.asp>

Laboratory Criteria

Confirmed Case

Culture:

Isolation of any *Legionella* organism from respiratory secretions, lung tissue, pleural fluid or other normally sterile fluid

Urinary antigen:

Detection of *Legionella pneumophila* serogroup 1 antigen in urine

Seroconversion:

$\geq 4x$ rise in serum antibody titer to *Legionella pneumophila* serogroup 1

Laboratory Criteria

Suspect Case

Seroconversion:

- ≥ 4x rise in Ab titer to specific species or serogroups of *Legionella* other than *L. pneumophila* serogroup 1
- ≥ 4x rise in Ab titer to multiple species of *Legionella* using pooled antigen

Detection:

Specific *Legionella* antigen or staining of the organism in respiratory secretions, lung tissue, or pleural fluid

Legionella spp by a validated nucleic acid assay

Case Definition

■ Suspected Case

- Clinically compatible illness
- At least one of the suspect lab criteria

■ Confirmed Case

- Clinically compatible illness with clinical or radiological diagnosed pneumonia
- At least one of the confirmatory lab criteria

Travel-associated case of Legionellosis

- A case that has a history of spending at least one night away from home, either in the same country of residence or abroad, in the 14 days before onset of illness
- May be used for either suspect or confirmed classification

Reservoirs

- Grow in slimes & biofilms on aqueous surfaces
- Survive within wide range of temp & pH
- Not eradicated with chlorine at levels used in domestic water
- Low levels can colonize a water source & grow to high concentrations under the right conditions

Exposure

- Hot water heaters/systems
- Hot and cold water taps
- Showers, Hot tubs
- Air conditioning cooling towers
- Evaporative condensers
- Humidifiers
- Whirlpool spas
- Respiratory therapy devices
- Decorative fountains
- Dental water lines
- Grocery store mist machines
- Peat/Peat moss/potting soil/moist soil

Showers, water taps, misters, spas



Hot Water Heaters



Cooling Towers



Whirlpools/Spas/Pool Misters/ Outdoor Misters



Produce Misters/Foggers

1989 LA Outbreak - 28 cases



Humidifiers

Water Reservoirs
Ultrasonic Transducers



C-PAP Machines



Water Fountains



2005 Outbreak

Rapid City South Dakota



Slide Provided Courtesy of CDC

Car Washes



Case Investigation

Completing the Surveillance Form

Preventive Measures

- Cooling towers
- Hot water systems
- Hot tubs and spas
- Respiratory therapy devices
- Hospitals

Acknowledgements

Contributors/Reviewers

Jeffrey Engel, MD -Contributor

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CDC Link

<http://www.cdc.gov/legionella/>

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