

# Bacterial Respiratory Tract Infections 2

A comprehensive overview of *Mycoplasma pneumoniae* and *Legionella pneumophila* - two critical atypical pneumonia pathogens

## Legionella pneumophila

Waterborne pathogen, causes Legionnaires' disease, facultative intracellular

## Mycoplasma pneumoniae

Lacks cell wall, causes "walking pneumonia," resistant to penicillin

### Mycoplasma Overview

Polymorphic bacterium without peptidoglycan cell wall. Common in young adults, spreads via respiratory droplets in close-contact settings.

### Clinical Presentation

1-3 week incubation. Gradual onset with fever, dry cough, malaise. May cause **hemolytic anemia** via cold agglutinins (IgM antibodies).

### Diagnosis & Treatment

PCR most sensitive. Culture shows "fried egg" colonies (2-3 weeks). Treat with macrolides, tetracyclines, or fluoroquinolones.

#### Attachment

Adhesin proteins bind respiratory epithelium, stopping ciliary clearance

#### Inflammation

Macrophage activation and cytokine production trigger coughing

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#### Immune Evasion

Pleomorphism enables intracellular survival, evading detection

## Mycoplasma Diagnostic Methods

- Direct:** Resists Gram stain; culture on Eaton's agar (2-3 weeks)
- Indirect:** Serology (IgM/IgG), cold agglutinins (50% positive), PCR (most sensitive)
- Imaging:** Chest X-ray shows diffuse patchy infiltrates

## Legionella pneumophila

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### Morphology

Gram-negative slender rods, motile with polar flagellum. Stains weakly; best visualized with silver stain.

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### Culture Requirements

Requires BCYE agar with cysteine and iron. Slow-growing (3-5 days), ground-glass colonies.

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### Epidemiology

Found in water systems (20-50°C). Transmitted via aerosolized contaminated water. Risk factors: age >50, smoking, immunosuppression.

## Pathogenesis Mechanism

- Inhalation of aerosolized bacteria
- Binds alveolar macrophages
- Prevents phagosome-lysosome fusion
- Replicates in protective vacuole
- Cell lysis releases bacteria, causing inflammation



### Legionnaires' Disease

Severe atypical pneumonia with fever >39°C, dry cough, dyspnea. May include diarrhea, confusion, hyponatremia.



### Pontiac Fever

Mild flu-like illness without pneumonia. Self-limiting, no treatment required.

## Legionella Diagnosis & Treatment

### Treatment Protocol

**Antibiotics:** Macrolides (azithromycin) or fluoroquinolones (levofloxacin)

**Duration:** 10-14 days

**Note:** Beta-lactams ineffective

### Diagnostic Tests

- Culture on BCYE agar
- Urinary antigen test (polysaccharide)
- Direct fluorescent antibody staining
- PCR assays
- Blood: hyponatremia, leukocytosis
- Chest X-ray: lobar infiltrate

## Comparative Analysis

Characteristic	Legionella pneumophila	Mycoplasma pneumoniae
Cell Wall	Present (Gram-negative)	Absent (no peptidoglycan)
Transmission	Aerosolized water	Respiratory droplets
Onset	Acute	Gradual (1-3 weeks)
Fever	High (>39°C)	Mild
Cough	Dry	Dry
X-ray Pattern	Lobar infiltrate	Diffuse patchy infiltrates
First-line Treatment	Macrolides/Fluoroquinolones	Macrolides
Beta-lactam Response	Ineffective	Resistant

### Key Clinical Pearls

**Mycoplasma:** Think "walking pneumonia" in young adults with gradual onset and dry cough. Check for cold agglutinins and use PCR for rapid diagnosis.

**Legionella:** Suspect in patients with recent water exposure (hotels, hospitals), high fever >39°C, and hyponatremia. Urinary antigen test is rapid and specific.