Diagnosis and Treatment of Mycoplasma Pneumonia*

*Mycoplasma pneumoniae* is one of the most common pathogens identified in mild ambulatory community-acquired pneumonia (CAP). The other common pathogens are *Streptococcus pneumoniae, Chlamydiophile pneumoniae,* and *Haemophilus influenza.* In recent studies, Mycoplasma infection was most common among people under 50 years of age who did not have significant comorbid conditions or abnormal vital signs. It is primarily found among school-aged children and young adults. Serious complications are rare.

**Prevalence/Incidence**
Mycoplasma pneumonia, a low level endemic disease, reaches epidemic levels at three to seven year intervals. These epidemics often begin in the fall and sometimes last for several months. *M. pneumoniae* causes approximately 20 percent of acute pneumonia infections in middle and high school students and 50 percent among college students and military recruits. The incidence of community-acquired *M. pneumoniae* in the adult population is approximately 15/100,000.1

**Transmission**
Transmission is person-to-person by respiratory droplet. Respiratory tract shedding of *M. pneumoniae* from both symptomatic and non-symptomatic people occurs for weeks (even months) and likely contributes to community outbreaks. Antibiotic therapy is more successful in relieving symptoms than eradicating the organism as shedding often continues for one to two weeks after antibiotics are started.2

**Clinical Presentation**
Patients present with fever, cough, headache, and malaise. One half of patients have all four symptoms. Rhinorrhea, myalgias, chest pain, sore throat and hoarseness appear in one fourth to one half of patients. The incubation period is from one to four weeks.1

**Diagnosis**
Diagnosis is based on clinical presentation (above) and is supported by chest radiography. Detection of rales or bronchial breath sounds while important are less sensitive and specific than chest radiographs that demonstrate an infiltrate.5 In the elderly patient both clinical signs and physical exam findings may be altered or lacking.

While microbiological studies can support a diagnosis of *M pneumoniae,* routine tests are often nonspecific or falsely negative.5

**Laboratory Testing**3,4,5
*M. pneumoniae* is a small, obligate, intracellular bacteria that has several shapes and sizes. The lack of a cell wall prevents staining with traditional gram stain.

**Culture**
*Advantage:* Differentiation of *M. pneumoniae* from other organisms that cause atypical CAP.

*Disadvantages:* Requires cholesterol to stimulate growth. Divides by binary fission and isolation of the organism may require 21 days or more. Does not survive well in transport media making culture insensitive for detection of this organism.

**Complement Fixation Test**
*Advantage:* Good sensitivity and specificity. 

*Disadvantages:* Because antibodies may persist in an infected person for a year or more, high titers may not indicate current infection.

**Cold Agglutinins**
*(non-specific erythrocyte agglutinating antibodies)*

*Advantage:* If cold agglutinins present in combination with clinical signs of *M. pneumoniae,* a presumptive diagnosis may be possible.

*Disadvantages:* Cold agglutinins are not specific for *M. pneumoniae* and not even produced in half of the people infected with these bacteria. Not recommended for definitive diagnosis.

**EIA (enzyme immunoassay)**

*Advantage:* Several kits available on the market for detection of *M. pneumoniae* IgG and IgM antibodies.

*Disadvantages:* Most kits require acute and convalescent sera collected 2-4 weeks apart. Tests may be simpler and somewhat quicker to perform, but they lack sensitivity.

**PCR (polymerase chain reaction)**

*Advantage:* PCR technology more available through reference laboratories

*Disadvantages:* PCR technology very expensive. A positive PCR--in the absence of seroconversion, positive culture or clinical disease--suggests inadequate specificity of the PCR assay, persistence of the organism after the infection has resolved, or an asymptomatic carrier state.

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Susceptibility Testing
Disadvantages: Traditional susceptibility methods are not practical due to the unusual growth requirements of *M. pneumoniae*. No accepted standard for susceptibility testing of Mycoplasma. No MIC breakpoints are endorsed by any regulatory agency. Lack of guidelines and interpretation of results can lead to inconsistent susceptibility profiles.

Treatment
Patients who present with community-acquired pneumonia (CAP) are typically treated empirically with antibiotics that cover *Streptococcus pneumoniae*, *Haemophilus influenzae*, and atypical organisms, including *Mycoplasma pneumoniae*, *Chlamydophile pneumoniae*, and *Legionella pneumophila*.

Common therapies for *M. pneumoniae* respiratory infections include macrolides, tetracyclines, and fluoroquinolones. According to the IDSA/ATS 2007 CAP consensus guidelines, a macrolide antibiotic is the first-line therapy when treating an otherwise healthy patient in an outpatient setting.

Some β-lactam antibiotics, such as penicillins and cephalosporins, are not effective because *M. pneumoniae* lacks a cell wall; β-lactam bactericidal activity relies on cell wall inhibition. Of the macrolide antibiotics, azithromycin is most commonly used due to efficacy, convenience of dosing/duration, and tolerability. Erythromycin, which is known for gastrointestinal side effects, including diarrhea, may reduce drug adherence.

In vitro studies have shown that macrolides are 100 times more active against *M. pneumoniae* than fluoroquinolones, followed by tetracyclines. The duration of treatment for an uncomplicated infection usually ranges from five to seven days, depending on antibiotic selection and the clinical stability of the patient.

<table>
<thead>
<tr>
<th>Class</th>
<th>Drug</th>
<th>Adult Dose</th>
<th>Pediatric Dose</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Macrolide</td>
<td>Azithromycin</td>
<td>500 mg in one dose, then 250 mg orally for 4 days</td>
<td>10 mg/kg in one dose on day 1, then 5 mg/kg daily for 4 days</td>
<td>Most commonly used; longer half-life &amp; post-antibiotic effect allows for shorter duration</td>
</tr>
<tr>
<td></td>
<td>Clarithromycin</td>
<td>250-500mg every 12 hours for 7 days</td>
<td>15 mg/kg/day in two divided doses for 10 days</td>
<td></td>
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<tr>
<td></td>
<td>Erythromycin</td>
<td>500mg every 6 hours for 7 days</td>
<td>30-40 mg/kg/day in four divided doses for 10 days</td>
<td>HIGH rate of gastrointestinal side effects</td>
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<tr>
<td>Fluoroquinolone</td>
<td>Levofloxacin</td>
<td>500mg daily for 7 days</td>
<td>Do not use in pediatrics</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Moxifloxacin</td>
<td>400mg daily for 7 days</td>
<td>Do not use in pediatrics</td>
<td></td>
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<tr>
<td>Tetra-cycline</td>
<td>Doxycycline</td>
<td>100mg every 12 hours for 7 days</td>
<td>2-4 mg/kg/day in 1-2 divided doses for 10 days, (max 100-200 mg/day)</td>
<td>Do not use in children less than 8 years of age</td>
</tr>
</tbody>
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Resources

Common Treatment of Mycoplasma Pneumonia

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