

Chlamydia

Chlamydia trachomatis



Learning Objectives

Upon completion of this content, the learner will be able to:

1. Describe the epidemiology of chlamydial infection in the U.S.
2. Describe the pathogenesis of *Chlamydia trachomatis*.
3. Describe the clinical manifestations of chlamydial infection.
4. Identify common methods used in the diagnosis of chlamydial infection.
5. List CDC-recommended treatment regimens for chlamydial infection.
6. Summarize appropriate prevention counseling messages for patients with chlamydial infection.
7. Describe public health measures for the prevention of chlamydial infection.

Lessons

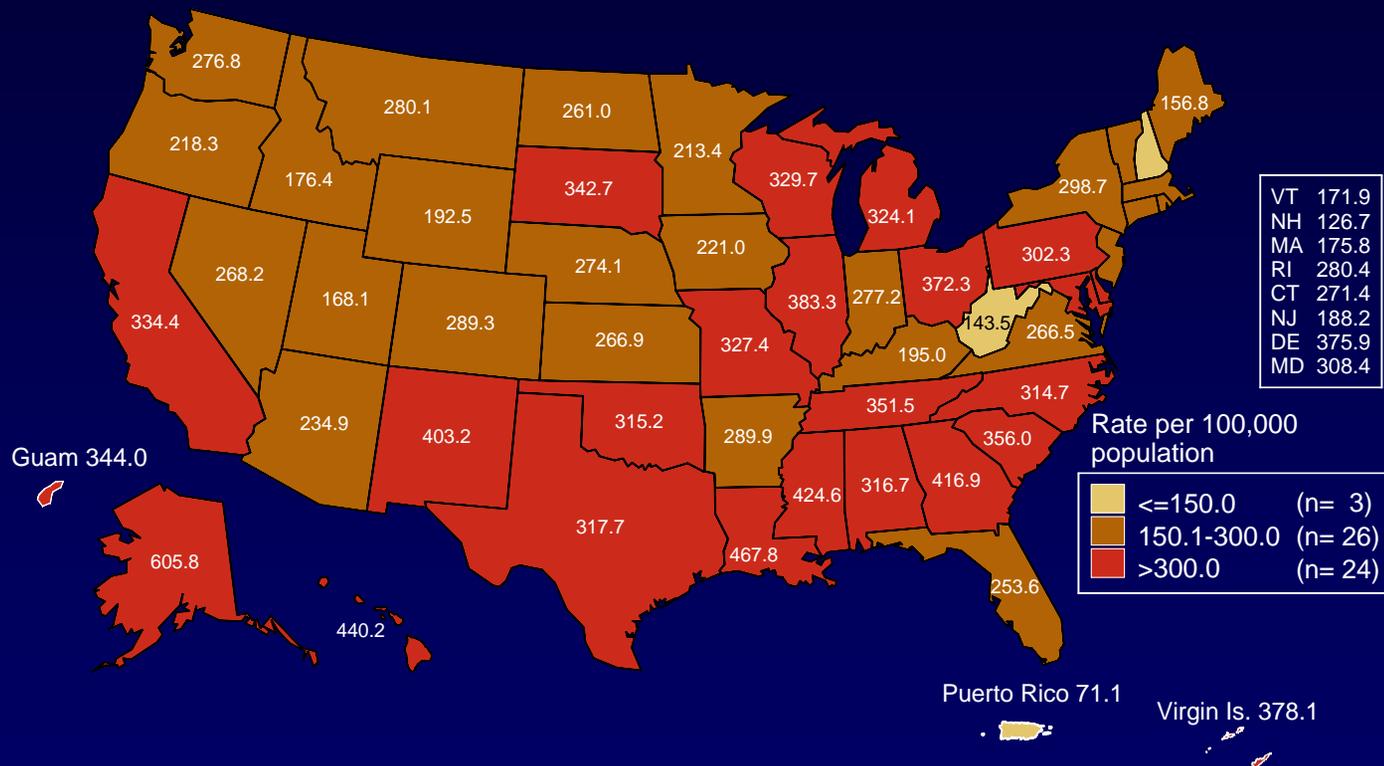
- I. Epidemiology: Disease in the U.S.
- II. Pathogenesis
- III. Clinical manifestations
- IV. Diagnosis
- V. Patient management
- VI. Prevention

Lesson I: Epidemiology: Disease in the U.S.

Incidence

- Estimated 3 million cases in U.S. annually
- Most frequently reported STD in U.S.
- Reported rates 3 times higher in females than in males

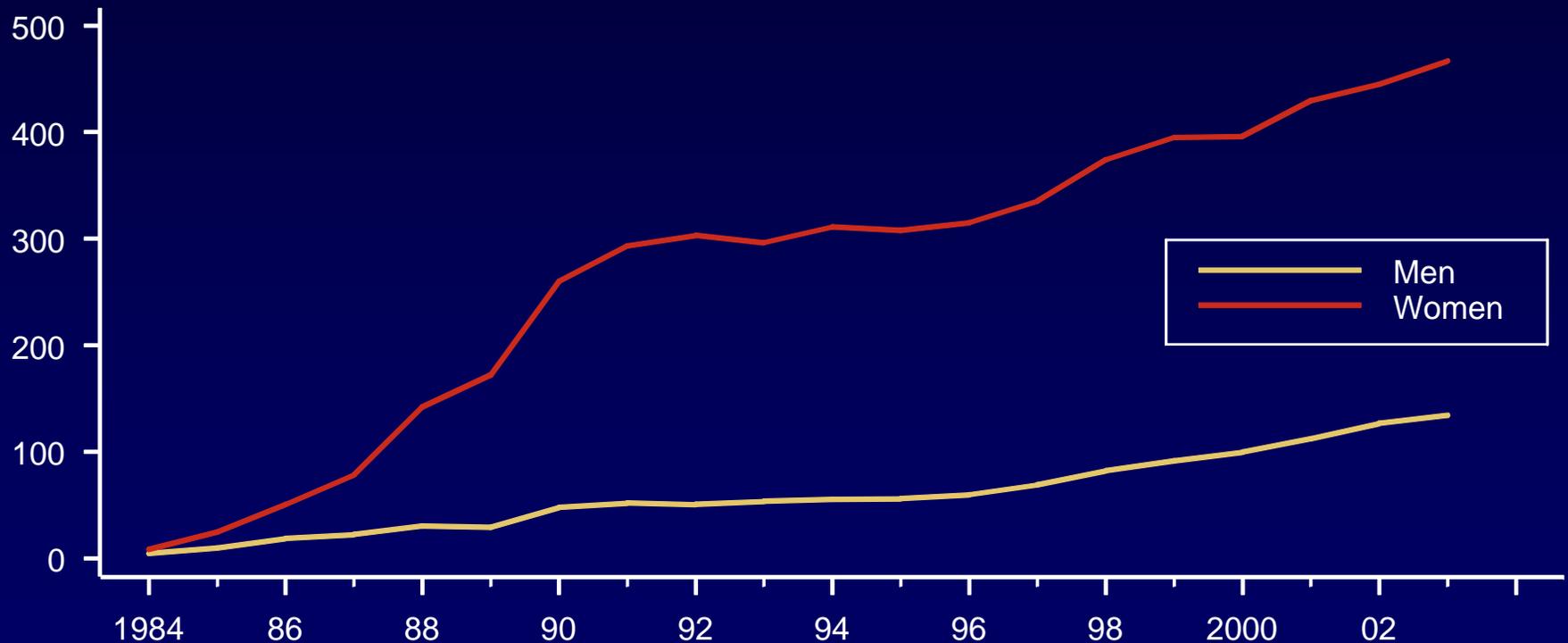
Chlamydia — Rates by state: United States and outlying areas, 2003



Note: The total rate of chlamydia for the United States and outlying areas (Guam, Puerto Rico and Virgin Islands) was 301.3 per 100,000 population.

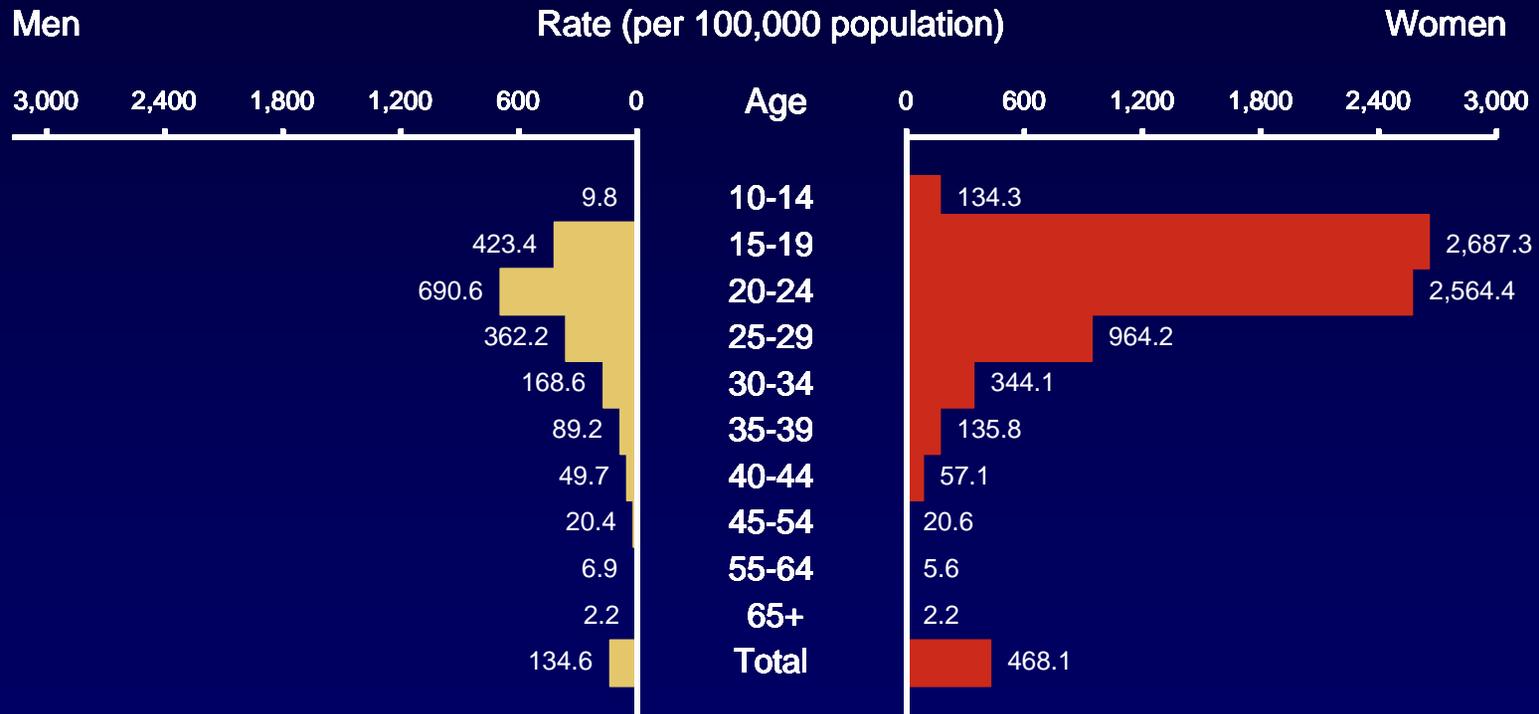
Chlamydia — Rates by sex: United States, 1984–2003

Rate (per 100,000 population)



Source: CDC/NCHSTP 2003 STD Surveillance Report

Chlamydia — Age- and sex-specific rates: United States, 2003



Prevalence

- Prevalence (approximate) in selected populations:
 - Family planning clinics, 3%-15%
 - Indian Health Service, 7%-9%
 - Youth detention facilities, 6%-28%
 - National job training recruits, 4%-16%

Risk Factors

- Adolescence
- New or multiple sex partners
- History of STD infection
- Presence of another STD
- Oral contraceptive user
- Lack of barrier contraception

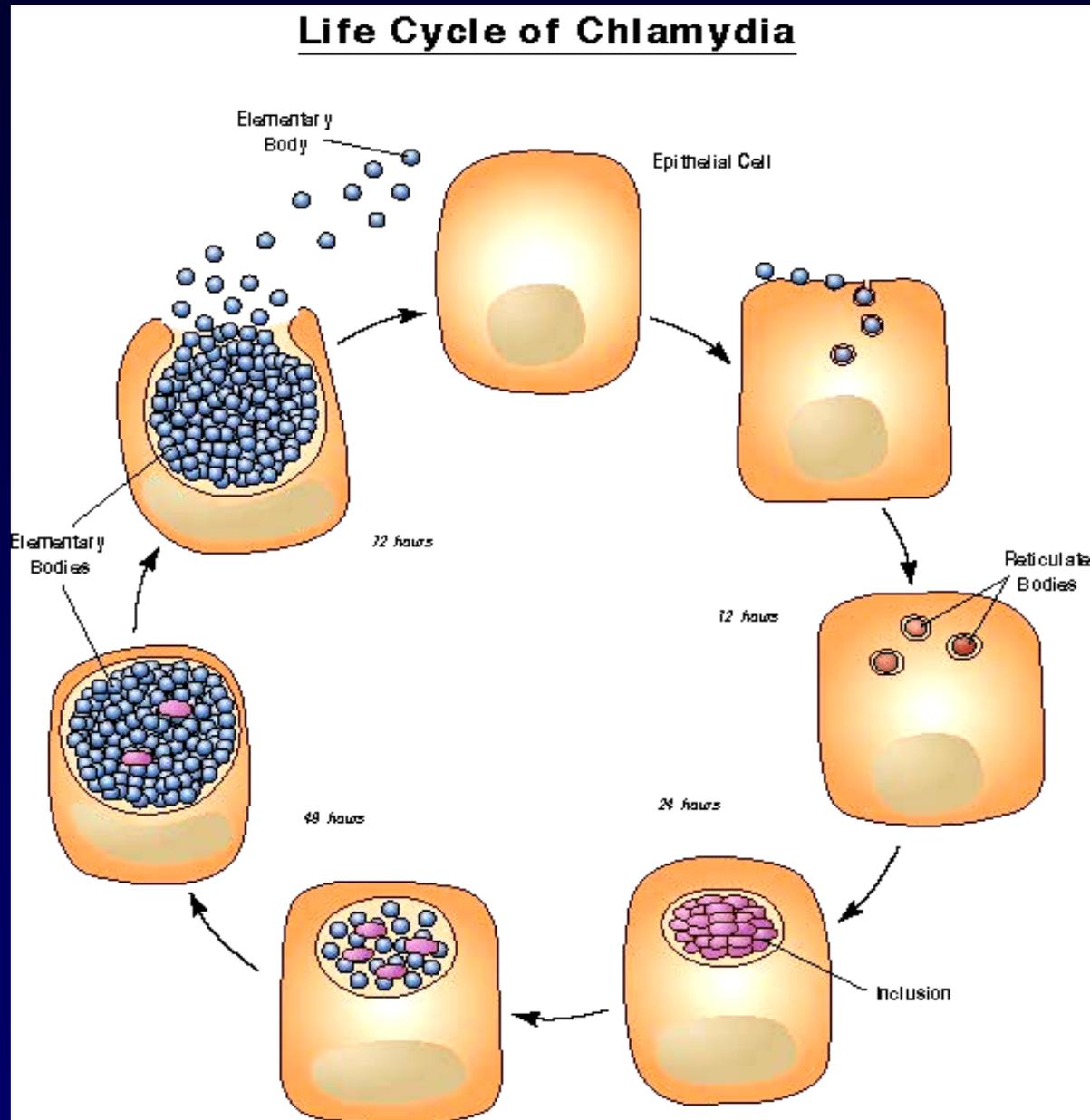
Transmission

- Transmission is **sexual** or **vertical**
- Highly transmissible
- Incubation period 7-21 days
- Significant asymptomatic reservoir exists in the population
- Re-infection is common
- Perinatal transmission results in neonatal conjunctivitis in 30%-50% of exposed babies

Lesson II: Pathogenesis

Microbiology

- Obligatory intracellular bacteria
- Infect columnar epithelial cells
- Survive by replication that results in the death of the cell
- Takes on two forms in its life cycle:
 - Elementary body (EB)
 - Reticulate body (RB)



Chlamydiaceae Family

(species that cause disease in humans)

Species (genus)	Disease
<i>C. trachomatis</i> 2 biovars, non-LGV LGV	Trachoma, NGU, MPC, PID, conjunctivitis, Infant pneumonia, LGV
<i>C. pneumoniae</i>	Pharyngitis, bronchitis, pneumonia
<i>C. psittaci</i>	Psittacosis

Lesson III: Clinical Manifestations

Clinical Syndromes Caused by *C. trachomatis*

	Local Infection	Complication	Sequelae
Men →	Conjunctivitis Urethritis Prostatitis	Reiter's syndrome Epididymitis	Chronic arthritis (rare) Infertility (rare)
Women →	Conjunctivitis Urethritis Cervicitis Proctitis	Endometritis Salpingitis Perihepatitis Reiter's syndrome	Infertility Ectopic pregnancy Chronic pelvic pain Chronic arthritis (rare)
Infants →	Conjunctivitis Pneumonitis Pharyngitis Rhinitis	Chronic lung disease?	Rare, if any

C. trachomatis Infection in Men

- Urethritis—One cause of non-gonococcal urethritis (NGU)
 - Majority (>50%) asymptomatic
 - Symptoms/signs if present: mucoid or clear urethral discharge, dysuria
 - Incubation period unknown (probably 5-10 days in symptomatic infection)

Non-Gonococcal Urethritis: Mucoïd Discharge



Source: Seattle STD/HIV Prevention Training Center at the University of Washington/UW HSCER Slide Bank

C. trachomatis Complications in Men

- Epididymitis
- Reiter's Syndrome
 - Rarely occurs in women

Swollen or tender testicles (epididymitis)

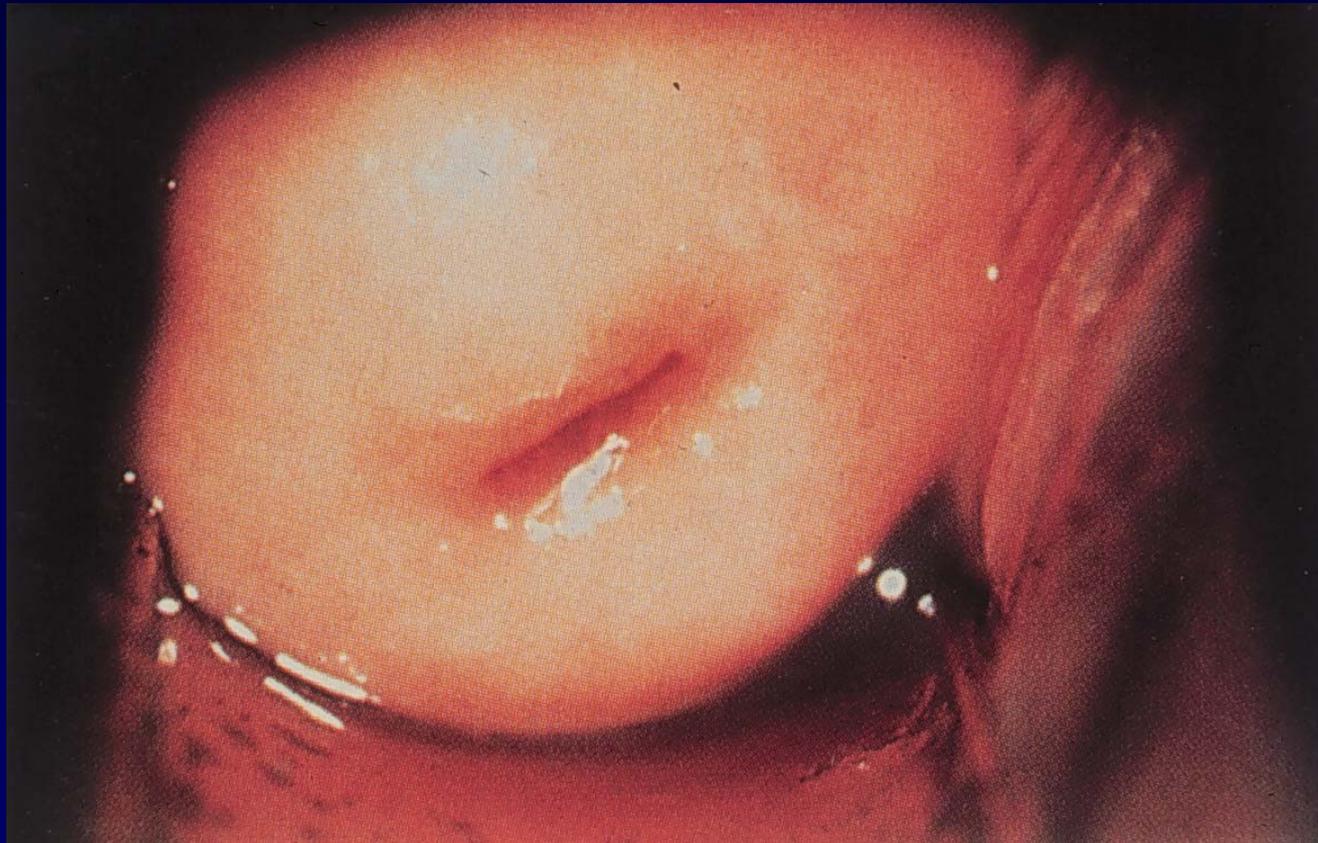


Source: Seattle STD/HIV Prevention Training Center at the University of Washington

C. trachomatis Infections in Women

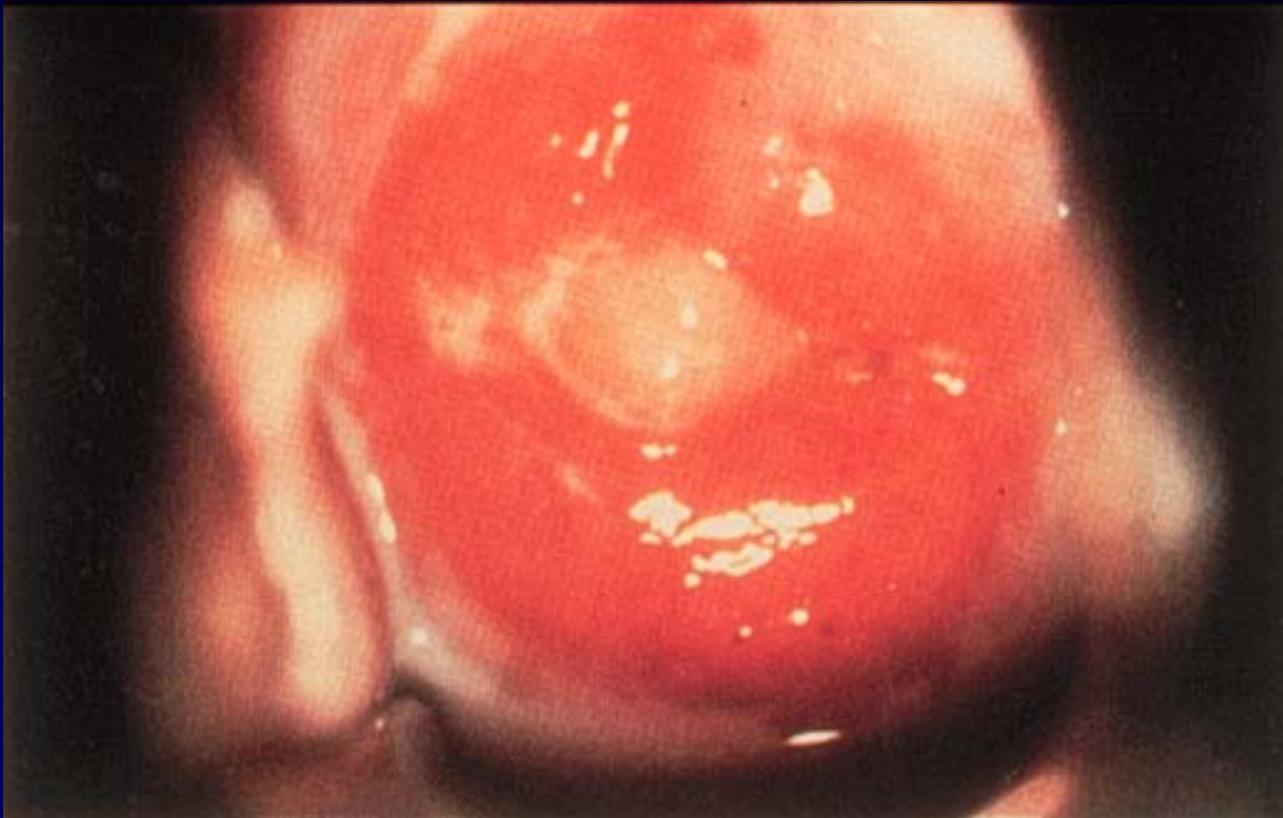
- Cervicitis
 - Majority (70%-80%) are asymptomatic
 - Local signs of infection, when present, include:
 - Mucopurulent endocervical discharge
 - Edematous cervical ectopy with erythema and friability
- Urethritis
 - Usually asymptomatic
 - Signs/symptoms, when present, include dysuria, frequency, pyuria

Normal Cervix



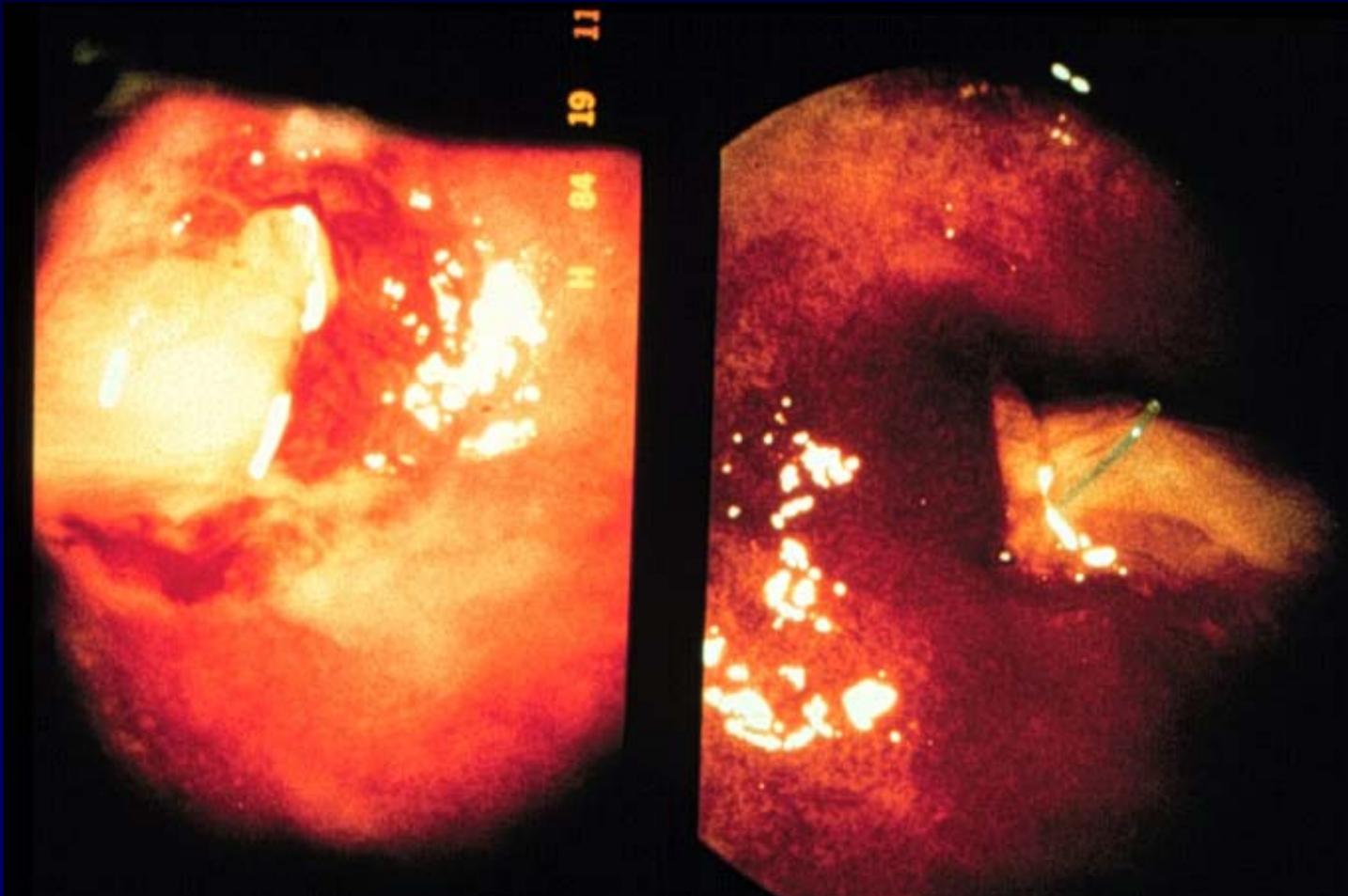
Source: STD/HIV Prevention Training Center at the University of Washington/Claire E. Stevens

Chlamydial Cervicitis



Source: STD/HIV Prevention Training Center at the University of Washington/Connie Celum and Walter Stamm

Cervicitis

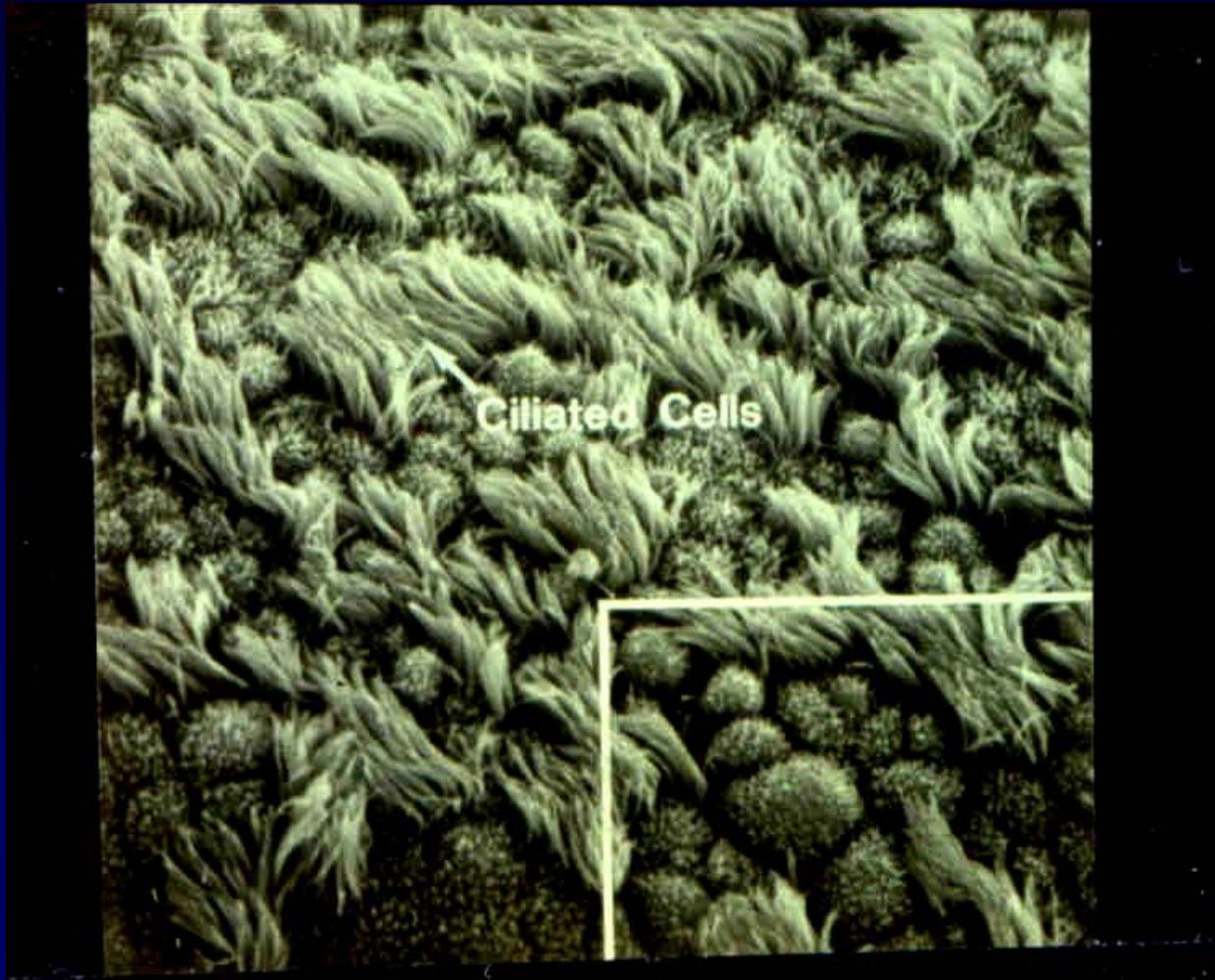


Source: St. Louis STD/HIV Prevention Training Center

C. trachomatis Complications in Women

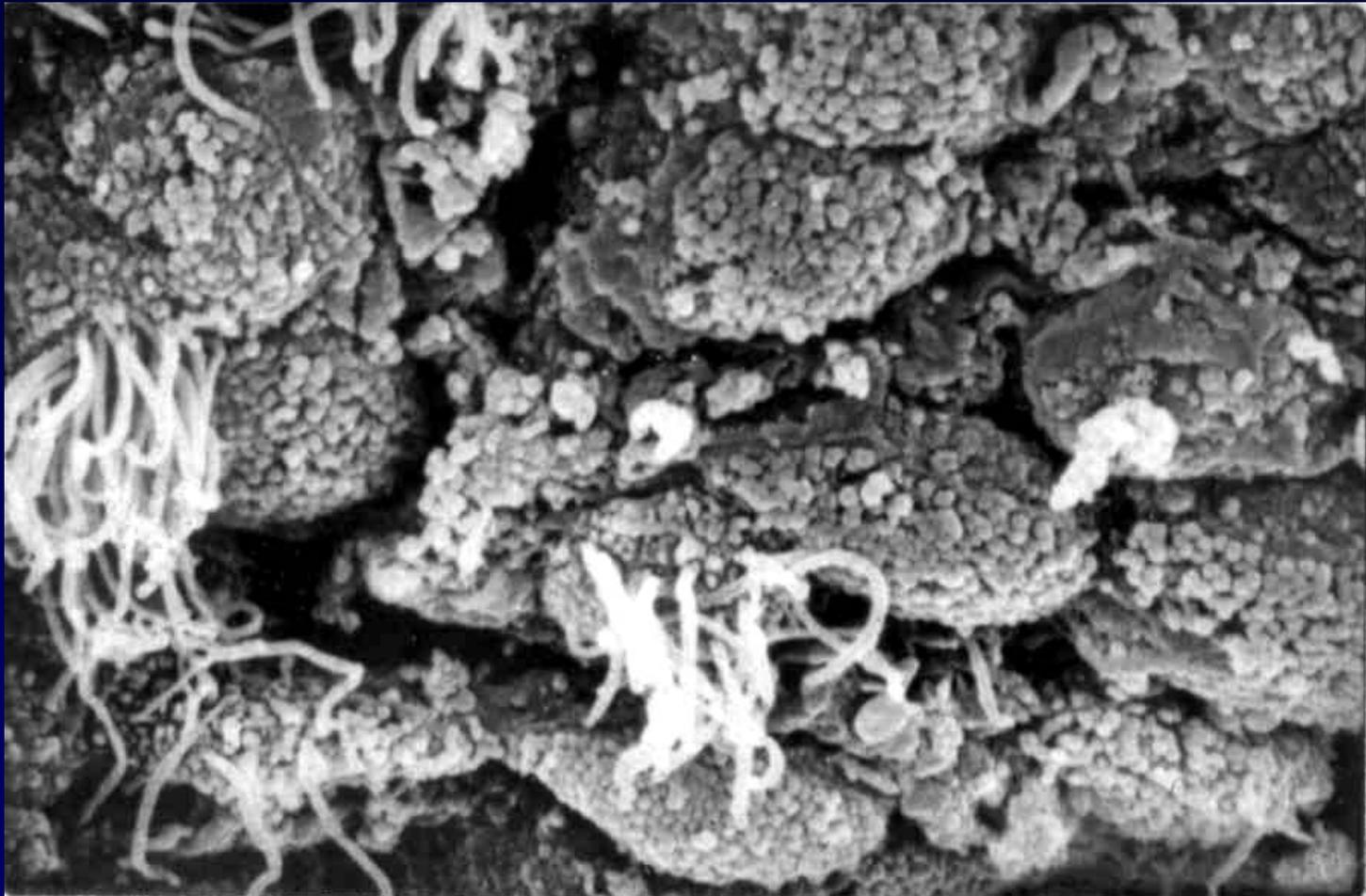
- Pelvic Inflammatory Disease (PID)
 - Salpingitis
 - Endometritis
- Perihepatitis (Fitz-Hugh-Curtis Syndrome)
- Reiter's Syndrome

Normal Human Fallopian Tube Tissue



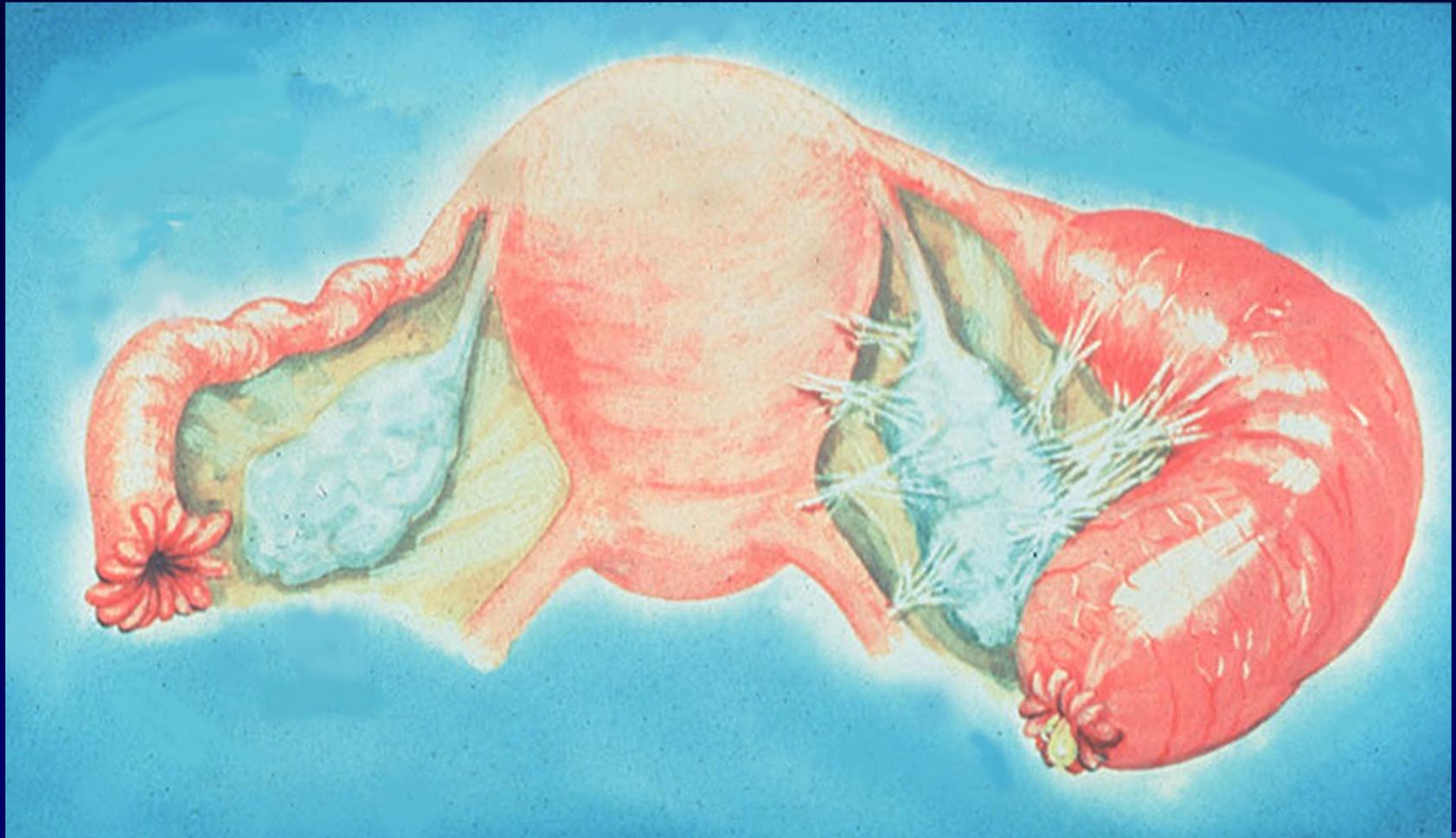
Source: Patton, D.L. University of Washington, Seattle, Washington

C. trachomatis Infection (PID)



Source: Patton, D.L. University of Washington, Seattle, Washington

Acute Salpingitis



Source: Cincinnati STD/HIV Prevention Training Center

C. trachomatis Syndromes Seen in Men or Women

- Non-LGV serovars
 - Conjunctivitis
 - Proctitis
 - Reiter's Syndrome
- LGV serovars
 - Lymphogranuloma venereum

LGV Lymphadenopathy



Source: CDC Division of STD Prevention Clinical Slides

C. trachomatis Infections in Infants

- Perinatal clinical manifestations:
 - Inclusion conjunctivitis
 - Pneumonia

C. trachomatis Infections in Children

- Pre-adolescent males and females:
 - Urogenital infections
 - Usually asymptomatic
 - Vertical transmission
 - Sexual abuse

Lesson IV: Diagnosis

Testing Technologies

- Culture
- Non-culture tests
 - Nucleic Acid Amplification Tests (NAATs)
 - Non-Nucleic Acid Amplification Tests (Non-NAATs)
 - Serology

Culture

- Historically the “gold standard”
- Variable sensitivity (50%-80%)
- High specificity
- Use in legal investigations
- Not suitable for widespread screening

NAATs

- NAATs amplify and detect organism-specific genomic or plasmid DNA or rRNA
- FDA cleared for urethral swabs from men/women, cervical swabs from women, and urine from both

NAATs

- Commercially available NAATs include:
 - Becton Dickinson *BDProbeTec*®
 - Gen-Probe *AmpCT*, *Aptima*®
 - Roche *Amplicor*®
- Significantly more sensitive than other tests

Non-NAATs

- Direct fluorescent antibody (DFA)
 - Detects intact bacteria with a fluorescent antibody
 - Variety of specimen sites
 - Can be used to determine quality of endocervical specimens
- Enzyme immunoassay (EIA)
 - Detects bacterial antigens with an enzyme-labeled antibody
- Nucleic acid hybridization (NA probe)
 - Detects specific DNA or RNA sequences of *C. trachomatis* and *N. gonorrhoeae*

Serology

- Rarely used for uncomplicated infections (results difficult to interpret)
- Criteria used in LGV diagnosis
 - Complement fixation titers $>1:64$ suggestive
 - Complement fixation titers $> 1:256$ diagnostic
 - Complement fixation titers $< 1:32$ rule out

Lesson V: Patient Management

Treatment of Uncomplicated Genital Chlamydial Infections

CDC-recommended regimens

- Azithromycin 1 g orally in a single dose, OR
- Doxycycline 100 mg orally twice daily for 7 days

Alternative regimens

- Erythromycin base 500 mg orally 4 times a day for 7 days, OR
- Erythromycin ethylsuccinate 800 mg orally 4 times a day for 7 days, OR
- Ofloxacin 300 mg orally twice a day for 7 days, OR
- Levofloxacin 500 mg orally once a day for 7 days

Treatment of Chlamydial Infection in Pregnant Women

CDC-recommended regimens

- Erythromycin base 500 mg orally 4 times a day for 7 days, OR
- Amoxicillin 500 mg orally 3 times a day for 7 days

Alternative regimens

- Erythromycin base 250 mg orally 4 times a day for 14 days, OR
- Erythromycin ethylsuccinate 800 mg orally 4 times a day for 7 days, OR
- Erythromycin ethylsuccinate 400 mg orally 4 times a day for 14 days, OR
- Azithromycin 1 g orally (single dose)

Treatment of Neonatal Conjunctivitis and/or Pneumonia

CDC-recommended regimen

- Erythromycin base or ethylsuccinate 50 mg/kg/day orally divided into 4 doses daily for 14 days

Treatment of Chlamydial Infection in Children

Children who weigh <45 kg:

- Erythromycin base or ethylsuccinate 50 mg/kg/day orally divided into 4 doses daily for 14 days

Children who weigh ≥ 45 kg, but are <8 years of age:

- Azithromycin 1 g orally in a single dose

Children ≥ 8 years of age:

- Azithromycin 1 g orally in a single dose, OR
- Doxycycline 100 mg orally twice a day for 7 days

Treatment of Lymphogranuloma Venereum (LGV)

CDC-recommended regimen

- Doxycycline 100 mg orally twice a day for 21 days

Alternative regimen

- Erythromycin base 500 mg orally 4 times a day for 21 days

Repeat Testing after Treatment

- Pregnant women
 - Repeat testing, preferably by culture, 3 weeks after completion of recommended therapy
- Non-pregnant women
 - Screen 3-4 months after treatment, especially adolescents
 - Screen at next health care visit
- Consider test of cure 3 weeks after completion of therapy for anyone treated with erythromycin

Lesson VI: Prevention

Why Screen for Chlamydia?

- Screening can reduce the incidence of PID by more than 50%.
- Most infections are asymptomatic.
- Screening decreases the prevalence of infection in the population and reduces the transmission of disease.

Screening Recommendations: Non-pregnant Women

- Sexually active women age 25 years and under should be screened annually.
- Women >25 years old should be screened if risk factors are present.
- Repeat screening of women 3-4 months after treatment for *C. trachomatis* infection, especially adolescents.
- Repeat screening of all women treated for *C. trachomatis* when they next present for care.

Screening Recommendations: Pregnant Women

- Screen all pregnant women at the first prenatal visit.
- Pregnant women aged <25 years and those at increased risk for chlamydia should be screened again in the third trimester.

Partner Management

- Sex partners should be evaluated, tested, and treated if they had sexual contact with the patient during the 60 days preceding the onset of symptoms or diagnosis of chlamydia.
- The most recent sex partner should be evaluated and treated even if the time of the last sexual contact was >60 days before symptom onset or diagnosis.

Reporting

- Chlamydia is a reportable STD in all states.
- Report cases to the local or state STD program.

Prevention Counseling

- Nature of the infection
 - Chlamydia is commonly asymptomatic in men and women.
 - In women, there is an increased risk of upper reproductive tract damage with re-infection.
- Transmission issues
 - Effective treatment of chlamydia may reduce HIV transmission and acquisition.
 - Abstain from sexual intercourse until partners are treated and for 7 days after a single dose of azithromycin or until completion of a 7-day regimen.

Prevention Counseling (continued)

- Risk reduction

The clinician should:

- Assess the patient's behavior-change potential.
- Discuss prevention strategies (abstinence, monogamy, condoms, limit number of sex partners, etc.). Latex condoms, when used consistently and correctly, can reduce the risk of transmission of chlamydia.
- Develop individualized risk-reduction plans.

Case Study



History

- Suzy Jones: 17-year-old college student who presents to the Student Health Center seeking advice about contraception
- Shy talking about her sexual practices
- Has never had a pelvic exam
- Has had 2 sex partners in past 6 months
- Does not use condoms or any other contraceptives
- Her periods have been regular, but she has recently noted some spotting between periods. Last menstrual period was 4 weeks ago.
- Denies vaginal discharge, dyspareunia, genital lesions, or sores

Physical Exam

- Vital signs: blood pressure 118/68, pulse 74, respiration 18, temperature 37.1° C
- Breast, thyroid, and abdominal exam within normal limits
- Genital exam reveals normal vulva and vagina
- The cervix appears inflamed, bleeds easily, with a purulent discharge coming from the cervical os.
- Bimanual exam is normal without cervical motion pain, uterine or adnexal tenderness.

Questions

1. What is the initial clinical diagnosis?
2. What are the *possible* etiologic agents associated with the clinical findings?
3. What is the most *likely* microbiologic diagnosis?
4. Which laboratory tests should be ordered or performed?

Laboratory Results

- NAAT for *Chlamydia trachomatis*: positive
- NAAT for *Neisseria gonorrhoeae*: negative
- RPR: negative
- Wet mount: pH 4.2, no clue cells or trichomonads but numerous WBCs
- KOH preparation: negative for “whiff test”
- HIV antibody test: negative
- Pap smear: ASC-US
- Pregnancy test: negative

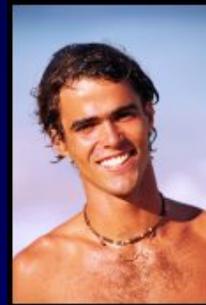
Questions

5. What is the final diagnosis?
6. What is the appropriate treatment at the initial visit?
7. What are the appropriate prevention and counseling messages for Suzy?
8. Who is responsible for reporting this case to the local health department?

Partner Management

Suzy's sex partners from the past year:

- John – Last sexual exposure 5 weeks ago
- Tom – Last sexual exposure 7 months ago
- Michael – Last sexual exposure 2 weeks ago



9. Which sex partners should be evaluated, tested, and treated?

Follow-Up

Suzy returned for a follow-up visit at 4 months.

- Her repeat Pap test came back normal.
- Her repeat chlamydia test returned positive.
- Suzy stated that her partner, Michael, went to get tested, but the test result was negative so he was not treated.

10. What is the appropriate treatment at the 4-month follow-up visit?