GENITO-URINARY INFECTIONS
About the Pathogenesis of Urinary Tract Infections

1. Certain bacterial characteristics predispose to urinary tract infection (UTI):
   a) Type I and P fimbriae (adhere to mannose-sensitive and -insensitive host cell receptors)
   b) Hemolysin production
   c) Resistance to serum cidal activity
   d) Ability to synthesize essential amino acids arginine and glutamine
   e) Urease production (*Proteus mirabilis*)

2. Certain host characteristics predispose to UTI:
   a) Urine usually inhibits bacterial growth [exceptions occur in pregnant women and patients with diabetes (glucose)].
   b) Mechanical properties can make bacterial growth more likely:
      i) Obstruction (flushing can be inhibited by prostatic hypertrophy, urethral stricture, defective bladder contraction, renal stones, vesicoureteral reflux).
      ii) Short urethra length and colonization of the vaginal area lead to higher risk in women (1% to 3% annual incidence compared with less than 0.1% in men).
      iii) Bladder catheterization bypasses the urethra.
   c) High ammonia in the renal medulla blocks complement, and high osmolality inhibits polymorphonuclear leukocytes.
About the Causes of Urinary Tract Infection

1. *Escherichia coli* is the most frequent pathogen, followed by *Klebsiella* and *Proteus*.
2. *Staphylococcus saprophyticus* causes 5% to 15% of cystitis cases in young, sexually active women.
3. Nosocomial infections usually involve *Enterobacter, Pseudomonas, enterococci, Candida, S. epidermidis,* and *Corynebacterium*.
About the Clinical Manifestations of Urinary Tract Infection

1. Symptoms of cystitis and pyelonephritis overlap.
2. Cystitis symptoms include dysuria, urinary frequency, hematuria, suprapubic discomfort.
3. Pyelonephritis symptoms include fever and chills, nausea and vomiting, tachycardia, hypotension, and costovertebral angle pain and tenderness. The disease is more likely to occur in:
   a) diabetic patients (who often have only symptoms of cystitis),
   b) elderly patients (who may present with confusion or somnolence), or
   c) patients who have had cystitis symptoms for more than 7 days.
4. Asymptomatic bacteriuria is defined as a positive culture with no symptoms, and usually without pyuria:
   a) Treat pregnant women to prevent low birthweight neonates.
   b) Treat adolescent children to prevent renal scarring.
5. Urethritis can be mistaken for cystitis; usual indicators are fewer than $10^8$ bacteria on culture and a lack of suprapubic tenderness.
6. Vaginitis can mimic cystitis; pelvic exam is a must if symptoms are associated with vaginal discharge.
About the Diagnosis of Urinary Tract Infection

1. Urinalysis should be performed in all patients with a possible urinary tract infection (UTI):
   a) More than 10 white blood cells per high-power field indicates pyuria.
   b) Leukocyte esterase dip stick is usually sensitive.

2. Unspun urine Gram stain can be helpful; 1 bacterium per high-power field indicates $10^4$ organisms per milliliter.

3. Urine culture requires quantitation to differentiate contamination from true infection.
   a) Not required in sexually active adult women with early symptoms of cystitis.
   b) More than $10^3$ organisms per milliliter indicates infection. Symptomatic women can have as few as $10^3$ organisms.
   c) IDSA guidelines recommend using more than $10^3$ organisms per milliliter as an indication of infection in symptomatic patients.
   d) Cultures must be processed immediately.
   e) Follow-up culture is warranted in the patient who experiences relapse of symptoms after completion of antibiotics.

4. Ultrasound is the imaging study of choice. Use in patients with upper-tract disease and persistent fever on antibiotics.
   b) preschool girls with a second UTI, or in boys or men with a UTI.

5. Intravenous pyelogram may be required to further delineate anatomic defects, but avoid in multiple myeloma or renal failure.

6. In patients not responding to antibiotics, use computed tomography scan with contrast to exclude perinephric abscess.
About the Treatment of Urinary Tract Infection

1. Cystitis: short course, 3 days (exceptions: boys and men, diabetic patients, women with symptoms for more than 7 days, and elderly people)
   a) Trimethoprim–sulfamethoxazole (TMP-SMX)
   b) Ciprofloxacin or levofloxacin
   c) Cefpodoxime proxetil
   d) Ciprofloxacin

2. Uncomplicated pyelonephritis: 2 weeks (not septic, not vomiting can use oral antibiotics)
   a) Fluoroquinolone preferred for empiric therapy
   b) If sensitivities known: TMP-SMX, cefpodoxime proxetil, or amoxicillin–clavulanate

3. Suspected bacteremia (chills, septic, hypotensive, vomiting): hospitalize, use intravenous antibiotics
   a) Third-generation cephalosporin (ceftriaxone)
   b) Ciprofloxacin
   c) Gentamicin
   d) Aztreonam

4. Extremely ill patient: usually treated with an aminoglycoside and a second antibiotic
   a) Cefepime
   b) Ciprofloxacin or levofloxacin
   c) An anti-pseudomonal penicillin
   d) A carbapenem
About Prevention of Urinary Tract Infections

1. Voiding or single-dose trimethoprim–sulfamethoxazole after intercourse reduces urinary tract infections (UTIs) in women.

2. In patients with anatomic defects that predispose to UTI, use daily low-dose trimethoprim–sulfamethoxazole or nitrofurantoin.

3. Antibiotic prophylaxis for bladder catheters is not recommended.
About Prostatitis

1. Primarily caused by gram-negative enteric organisms:
   a) *Escherichia coli* is most frequent.
   b) *Klebsiella* and *Proteus* are also cultured; *Pseudomonas, Enterobacter* species, and *Serratia* are less common.
   c) Gram-positive pathogens are rare, except for enterococci.

2. Pathogenesis is unclear:
   a) Reflux from urethra [often associated with a urinary tract infection (UTI)]
   b) Depletion of prostatic antibacterial factor

3. Clinical manifestations:
   a) Acute prostatitis—fever, chills, dysuria, and urinary frequency; bladder outlet obstruction. Prostate tender (do not massage, can precipitate bacteremia).
   b) Chronic prostatitis—low-grade fever, myalgias, and arthralgias, recurrent UTIs

4. Diagnosis: By urine or blood culture, or both

5. Treatment:
   a) Acute disease—trimethoprim-sulfamethoxazole (TMP-STX) or ciprofloxacin
   b) Chronic disease—prolonged therapy with TMP-STX or ciprofloxacin (6 to 12 weeks); may require prostatectomy
About Urethritis

1. Causes:
   a) *Chlamydia trachomatis* and *Neisseria gonorrhoeae* are associated with a purulent discharge.
   b) *Ureaplasma urealyticum* and noninfectious causes are non-purulent.

2. Symptoms and signs:
   a) Burning on urination, worse with concentrated urine after alcohol consumption
   b) Staining of underwear, mucous in the urine.
   c) Meatus erythematous, milky discharge from penis

3. Diagnosis:
   a) Primarily by DNA probes
   b) Gram stain—In gonorrhea, intracellular gram-negative diplococci almost always found; negative Gram stain indicates non-gonococcal disease (NGU)
   c) Culture of *N. gonorrhoeae* using 5% CO₂ has to be planted immediately

4. Treatment:
   a) Third-generation cephalosporin or a fluoroquinolone for gonorrhea
   b) Macrolide, tetracycline, fluoroquinolone, or sparflaxacin for NGU
About the Causes and Pathogenesis of Pelvic Inflammatory Disease

1. Primarily caused by Neisseria gonorrhoeae and Chlamydia trachomatis. Other, less common, pathogens include
   a) Streptococcus pyogenes and Haemophilus influenzae (most frequently accompany gonorrhea and chlamydia).
   b) group B streptococci, Escherichia coli, Klebsiella species, Proteus mirabilis, and anaerobes (least frequent).

2. Cervical canal usually prevents vaginal flora from invading the endometrium.
   a) Menstruation allows bacteria to bypass the cervix, with pelvic inflammatory disease (PID) usually beginning 7 days after menstruation.
   b) Delayed treatment of urethritis leads to PID (15% of cases progress to PID).

3. Risk factors for PID:
   a) Young age (sexually active teenagers at highest risk)
   b) Multiple sexual partners
   c) Past history of PID
<table>
<thead>
<tr>
<th>Drug</th>
<th>Dose</th>
<th>Relative Efficacy</th>
<th>Comments</th>
</tr>
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<tr>
<td><strong>Gonococcal urethritis</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Cefixime</td>
<td>400 mg PO once</td>
<td>First line</td>
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<tr>
<td>Cefixime</td>
<td>125 mg IM once</td>
<td>First line</td>
<td>IM injection</td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>500 mg PO once</td>
<td>First line</td>
<td>Increased resistance to fluoroquinolones in Hawaiian Islands</td>
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<tr>
<td>Difloxacin</td>
<td>400 mg PO once</td>
<td>First line</td>
<td></td>
</tr>
<tr>
<td>Levofloxacin</td>
<td>250 mg PO once</td>
<td>First line</td>
<td>(500 mg q24h for disseminated disease)</td>
</tr>
<tr>
<td>Combine with</td>
<td></td>
<td></td>
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<tr>
<td>Azithromycin</td>
<td>2 g PO once</td>
<td>Alternative</td>
<td></td>
</tr>
<tr>
<td>Doxycycline</td>
<td>100 mg PO q12h for 7 days</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spectinomycin</td>
<td>2 g IM once</td>
<td>Alternative</td>
<td></td>
</tr>
<tr>
<td>Ceftriaxone</td>
<td>500 mg IM once</td>
<td>Alternative</td>
<td></td>
</tr>
<tr>
<td>Cefixime</td>
<td>2 g IM</td>
<td>Alternative</td>
<td></td>
</tr>
<tr>
<td>with probenecid</td>
<td>1 g PO once</td>
<td></td>
<td></td>
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<tr>
<td><strong>Disseminated gonococcal disease</strong></td>
<td></td>
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<tr>
<td>Ceftriaxone</td>
<td>1 g IV or IM q24h</td>
<td>First line</td>
<td>Continue for 24-48 hours; after clinical improvement, switch to an oral regimen to complete 7 days minimum</td>
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<tr>
<td>Cefotaxime, or</td>
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<td>Alternative</td>
<td></td>
</tr>
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<td>Cefixime</td>
<td>1 g IV q8h</td>
<td></td>
<td>Same duration and PO regimen as for ceftriaxone</td>
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<tr>
<td>Difloxacin</td>
<td>400 mg IV q12h</td>
<td>Alternative</td>
<td>Same duration and PO regimen as for ceftriaxone</td>
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<tr>
<td>Levofloxacin</td>
<td>250 mg IV q24h</td>
<td>Alternative</td>
<td>Same duration and PO regimen as for ceftriaxone</td>
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<tr>
<td>Spectinomycin</td>
<td>2 g IM q24h</td>
<td>Alternative</td>
<td></td>
</tr>
<tr>
<td><strong>Non-gonococcal urethritis</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Azithromycin</td>
<td>1 g PO once</td>
<td>First line</td>
<td></td>
</tr>
<tr>
<td>Doxycycline</td>
<td>100 mg PO q12h for 7 days</td>
<td>First line</td>
<td></td>
</tr>
<tr>
<td>Erythromycin base</td>
<td>500 mg PO q6h for 7 days</td>
<td>Alternative</td>
<td></td>
</tr>
<tr>
<td>Difloxacin</td>
<td>300 mg PO q12h for 7 days</td>
<td>Alternative</td>
<td></td>
</tr>
<tr>
<td>Levofloxacin</td>
<td>500 mg PO q24h for 7 days</td>
<td>Alternative</td>
<td></td>
</tr>
<tr>
<td>Amoxicillin</td>
<td>500 mg PO q8h</td>
<td>Alternative</td>
<td>Use if recurrent urethritis to treat Trichomonas vaginalis</td>
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<tr>
<td>Metronidazole, plus</td>
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<tr>
<td>Azithromycin</td>
<td>2 g PO once</td>
<td></td>
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</tr>
<tr>
<td>Erythromycin base</td>
<td>1 g PO once</td>
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<tr>
<td><strong>Pelvic inflammatory disease—IV regimens</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(A) Cefotan, or</td>
<td>2 g IV q12h</td>
<td>First line</td>
<td>Continue for 24 hours after improvement</td>
</tr>
<tr>
<td>Cefixime, plus</td>
<td>2 g IV q6h</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doxycycline</td>
<td>100 mg PO q12h for 14 days</td>
<td></td>
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</tr>
<tr>
<td>Drug</td>
<td>Dose</td>
<td>Relative Efficacy</td>
<td>Comments</td>
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<td>Pelvic inflammatory disease—IV regimens</td>
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<tr>
<td>(B) Clindamycin, plus gentamicin</td>
<td>900 mg IV q8h, 1.5 mg/kg IV q8h, or 7 mg/kg IV q24h</td>
<td>First line</td>
<td>Continue IV for 24 hours after improvement, then switch to clindamycin 450 mg PO q6h to complete 14 days</td>
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<tr>
<td>Ofloxacin, or levofloxacin, with or without metronidazole</td>
<td>400 mg IV q12h, 500 mg IV q24h, or 500 mg IV q24h</td>
<td>Alternative</td>
<td>Metronidazole adds anaerobic coverage</td>
</tr>
<tr>
<td>Ampicillin/subactam, plus doxycycline</td>
<td>3 g IV q6h, 100 mg IV or PO q12h</td>
<td>Alternative</td>
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</tr>
<tr>
<td>Pelvic inflammatory disease—Oral regimens</td>
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<tr>
<td>(A) Ofloxacin, or levofloxacin, with or without metronidazole</td>
<td>400 mg PO q12h, 500 mg PO q24h, or 500 mg PO q12h for 14 days</td>
<td>First line</td>
<td></td>
</tr>
<tr>
<td>(B) Ceftriaxone, or cefoxitin, plus doxycycline, with or without metronidazole</td>
<td>250 mg IM once, 2 g IM + probenecid 1 g, 100 mg PO q12h for 14 days</td>
<td>First line</td>
<td>Metronidazole adds anaerobic coverage</td>
</tr>
<tr>
<td>Genital ulcers: Herpes simplex—first episode</td>
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<tr>
<td>Acyclovir</td>
<td>400 mg PO q8h for 7–10 days</td>
<td>First line</td>
<td>Less expensive</td>
</tr>
<tr>
<td>Acyclovir</td>
<td>200 mg PO 5 times daily, 7–10 days</td>
<td>First line</td>
<td>Less expensive</td>
</tr>
<tr>
<td>Famciclovir</td>
<td>250 mg PO q8h for 7–10 days</td>
<td>First line</td>
<td></td>
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<tr>
<td>Valacyclovir</td>
<td>1 g PO q12h for 7–10 days</td>
<td>First line</td>
<td></td>
</tr>
<tr>
<td>Genital ulcers: Herpes simplex—episodic therapy, HIV-negative</td>
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<tr>
<td>Acyclovir</td>
<td>Same as first episode, for 5 days</td>
<td>First line</td>
<td>Less expensive</td>
</tr>
<tr>
<td>Acyclovir</td>
<td>800 mg q12h for 5 days</td>
<td>First line</td>
<td>Less expensive</td>
</tr>
<tr>
<td>Acyclovir</td>
<td>800 mg q8h for 2 days</td>
<td>First line</td>
<td></td>
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<tr>
<td>Famciclovir</td>
<td>125 mg q12h for 5 days</td>
<td>First line</td>
<td></td>
</tr>
<tr>
<td>Valacyclovir</td>
<td>500 mg PO q12h for 3 days</td>
<td>First line</td>
<td></td>
</tr>
<tr>
<td>Valacyclovir</td>
<td>1 g q24h for 5 days</td>
<td>First line</td>
<td></td>
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<tr>
<td>Genital ulcers: Herpes simplex—episodic therapy, HIV-positive</td>
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<td></td>
<td></td>
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<tr>
<td>Acyclovir</td>
<td>Same as first episode, for 5–10 days</td>
<td>First line</td>
<td>Less expensive</td>
</tr>
<tr>
<td>Famciclovir</td>
<td>500 mg PO q12h for 5–10 days</td>
<td>First line</td>
<td></td>
</tr>
<tr>
<td>Valacyclovir</td>
<td>1 g PO q12h for 5–10 days</td>
<td>First line</td>
<td></td>
</tr>
<tr>
<td>Genital ulcers: Herpes simplex—daily suppressive therapy, HIV-negative</td>
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<td></td>
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<tr>
<td>Acyclovir</td>
<td>400 mg PO q12h</td>
<td>First line</td>
<td>Less expensive</td>
</tr>
<tr>
<td>Famciclovir</td>
<td>250 mg PO q24h</td>
<td>First line</td>
<td></td>
</tr>
<tr>
<td>Valacyclovir</td>
<td>500 mg PO q24h</td>
<td>First line</td>
<td></td>
</tr>
<tr>
<td>Valacyclovir</td>
<td>1 g PO q24h</td>
<td>First line</td>
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</table>
About the Clinical Manifestations of Pelvic Inflammatory Disease

1. Lower abdominal pain during or immediately following menses,
   a) made worse by jarring motions,
   b) accompanied by vaginal bleeding (one third of cases), and
   c) commonly presenting with vaginal discharge.

2. On physical exam,
   a) only half of patients have fever.
   b) bilateral lower quadrant tenderness and cervical, uterine, and bilateral adnexal tenderness are present.
   c) right upper quadrant tenderness indicates Fitz–Hugh–Curtis syndrome.
   d) localized tenderness to one adnexa suggests tubo-ovarian abscess.
About the Diagnosis and Treatment of Pelvic Inflammatory Disease

1. No specific test is available for pelvic inflammatory disease (PID); diagnosis is usually clinical:
   a) Erythrocyte sedimentation rate and C-reactive protein are elevated. Normal values make this diagnosis unlikely.
   b) On examination of vaginal exudate, more than 3 white blood cells per high-power field is 80% sensitive and 40% specific.

2. Definitive diagnosis can be made by
   a) Laparoscopy (low sensitivity; should be reserved for the seriously ill patient).
   b) Histologic evidence of endometritis on biopsy.
   c) Imaging revealing thickened, fluid-filled oviducts with or without free pelvic fluid or tubo-ovarian swelling.

3. To prevent infertility and chronic pain, the threshold for treatment should be low:
   a) Outpatient treatment—ofloxacin or levofloxacin, plus metronidazole for 14 days or 1 dose of ceftriaxone, plus doxycycline with or without metronidazole for 14 days.
   b) Inpatient treatment—cefoxitin or cefotetan, plus doxycycline, or clindamycin plus gentamicin.
   c) Laparoscopy to rule out tubo-ovarian abscess; laparotomy to rule out ruptured abscess.
<table>
<thead>
<tr>
<th>Disease</th>
<th>Number</th>
<th>Location</th>
<th>Tenderness</th>
<th>Appearance</th>
<th>Adenopathy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Herpes simplex virus</td>
<td>Clusters</td>
<td>Labia, penis</td>
<td>Tender</td>
<td>Uniform size, clean base, erythematous border</td>
<td>Very tender inguinal nodes</td>
</tr>
<tr>
<td>Syphilis</td>
<td>1–2</td>
<td>Vagina, penis</td>
<td>One third tender</td>
<td>Clean base, indurated border</td>
<td>Rubbery, mildly tender</td>
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<tr>
<td>Chancroid</td>
<td>—</td>
<td>Labia, penis</td>
<td>Tender</td>
<td>Can be large; ragged and necrotic base, undermined edge</td>
<td>Very tender fluctuant inguinal nodes</td>
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<tr>
<td>Lymphogranuloma venereum</td>
<td>—</td>
<td>Labia, penis</td>
<td>Painless</td>
<td>Ulcer lasts 2–3 weeks, spontaneously heals at time of fluctuant adenopathy</td>
<td>Fluctuant inguinal nodes, &quot;groove sign&quot;</td>
</tr>
<tr>
<td>Donovanosis</td>
<td>Kissing lesions</td>
<td>Labia, penis</td>
<td>Painless</td>
<td>Clean, beefy red base; stark white heaped-up edges</td>
<td>Nodes usually firm, can mimic lymphogranuloma venereum</td>
</tr>
<tr>
<td>Behcet’s syndrome</td>
<td>—</td>
<td>Mouth, scrotum or vulva</td>
<td>Painful</td>
<td>Yellow necrotic base</td>
<td>Adenopathy minimal</td>
</tr>
</tbody>
</table>
About Genital Ulcers

1. Genital ulcers have five major causes: herpes simplex virus (HSV), syphilis, chancroid, lymphogranuloma venerium (LGV), donovanosis, and Behcet’s syndrome

2. Diagnosis is usually made by the clinical characteristics of the ulcer (not always reliable):
   a) Size and location
   b) Pain and tenderness
   c) Appearance of base and edges
   d) Lymphadenopathy

3. Laboratory studies include VDRL (Venereal Disease Research Laboratory), HIV antibody, Gram stain (for suspected chancroid), viral culture for HSV, LGV serum titers, dark-field exam for syphilis

4. Treatment:
   a) HSV — acyclovir, valacyclovir, or famciclovia
   b) Syphilis — penicillin
   c) Chancroid — azithromycin or ceftriaxone
   d) Donovanosis — trimethoprim—sulfamethoxazole or doxycycline
   e) LGV — doxycycline or erythromycin
About the Epidemiology of Syphilis

1. Transmitted by sexual intercourse.
2. Can cross the placenta and cause congenital disease.
3. Direct contact with an infected lesion can occasionally spread the disease, as can a blood transfusion drawn from a patient with early disseminated disease.
4. Annual incidence in the United States is 28,000 cases.
5. Incidence waxes and wanes depending on changes in sexual practices and public health funding.
About the Pathogenesis and Manifestations of Primary Syphilis

1. Treponema pallidum is a very thin, long bacterium that moves by flexing. Doubling time is very slow (30 hours); it cannot be grown by conventional methods.

2. Able to penetrate skin; initially multiplies subcutaneously.

3. Stimulates acute inflammation, followed by cell-mediated and humoral immunity.

4. Inflammation leads to tissue destruction. The resulting painless skin ulcer teams with spirochetes that can readily be seen with darkfield microscopy.
About Secondary Syphilis

1. After skin penetration, *Treponema pallidum* enters the lymphatics and bloodstream, and disseminates throughout the body.

2. Pink to red, macular, maculopapular, or pustular rash, begins on trunk and spreads to extremities, palms, and soles. Less commonly seen are a) condyloma lata in moist groin areas, and b) areas of alopecia in eyebrows and beard.

3. Lymphadenopathy is generalized, and enlarged epitrochlear nodes suggests the diagnosis.

4. Basilar meningitis can cause ocular motor, pupillary, facial, and hearing deficits.

5. Anterior uveitis, glomerulonephritis, hepatitis, synovitis, and periostitis can result.

About Late Neurosyphilis

1. Meningovascular syphilis causes arteritis and cerebral infarction. Can be a rare cause of stroke in younger patients. Occurs within 5 to 10 years of primary disease.

2. General paresis arises from direct damage to the cerebral cortex by spirochetes, 15 to 20 years after primary disease. Includes:
   a) emotional lability, paranoia, delusions, hallucinations, megalomania; and
   b) tremors, hyperreflexia, seizures, slurred speech, Argyll Robertson pupils, optic atrophy.

3. Tabes dorsalis is caused by demyelination of the posterior column, 15 to 20 years after primary disease. Includes:
   a) ataxic gait, loss of position sense, lightening pains, absence of deep tendon reflexes, loss of bladder function; and
   b) Charcot’s joints, skin ulcers.
About Cardiovascular Syphilis and Late Benign Gummas

1. Arteritis of the vasa vasorum causes damage to the aortic vessel wall, 15 to 30 years after primary disease. Includes
   a) dilatation of the proximal aorta, leading to aortic regurgitation and congestive heart failure; and
   b) saccular aneurysms, primarily of the ascending and transverse aorta.
   c) Chest radiographs may demonstrate linear calcifications of the aorta.

2. Gummas are granulomatous-like lesions, rare today, except in patients with AIDS.
   a) Skin gummas can break down, forming a chronic ulcer.
   b) Lytic bone lesions can cause tenderness and draining sinuses.
   c) Mass lesions of cerebral cortex, liver, and gastric antrum.
About Testing for Syphilis

1. Non-treponemal tests: The VDRL (Venereal Disease Research Laboratory) and RPR (rapid plasma reagin) test the ability of serum to flocculate a cardiolipin–cholesterol–lecithin antigen.
   a) Modern tests produce only occasional false positive results, usually connective tissue disease.
   b) Prozone phenomenon observed in 2% of cases.
   c) Can be used as a marker of response to therapy.

2. Treponemal tests measure antibody directed against the treponeme.
   a) Specific and sensitive, but antibody titers may persist for life.
   b) Not useful for assessing disease activity, used to verify a positive VDRL or RPR.

3. Tests of cerebrospinal fluid (CSF):
   a) A VDRL of the CSF is positive in one half of neurosyphilis cases.
   b) A peripheral VDRL is positive in three quarters of cases.
   c) Specific treponemal test is positive in all cases, should be ordered when considering neurosyphilis.
About the Treatment of Syphilis

1. Penicillin is the drug of choice:
   a) Therapy must be prolonged (2 weeks) because of the slow rate of growth of the treponeme.
   b) Jarisch–Herxheimer reaction is common: 10% to 25% at most stages, 70% to 90% in secondary disease.

2. Primary or secondary syphilis. Intramuscular benzathine penicillin or, for the penicillin-allergic patient, doxycycline for 2 weeks.

3. Early latent syphilis (within 1 year of exposure). Intramuscular benzathine penicillin or, for the penicillin-allergic patient, doxycycline for 4 weeks.

4. Late latent syphilis. Intramuscular benzathine penicillin for 3 weeks, or, for the penicillin-allergic patient, doxycycline for 4 weeks.

5. Neurosyphilis. Intravenous aqueous penicillin G for 2 weeks, or intramuscular procaine penicillin plus probenecid for 2 weeks.

6. Late syphilis (other than neurosyphilis). Intramuscular benzathine penicillin for 3 weeks, or, for the penicillin-allergic patient, doxycycline for 4 weeks.
About Venereal Warts

1. Condyloma acuminata (anogenital warts) are caused by the human papilloma virus (HPV).
2. The papules vary in size and can be visualized by treatment with 3% to 5% acetic acid.
3. Genital warts predispose to epithelial cell cancers by altering the function of the p53 protein.
4. Palliative treatment is available:
   a) Cryotherapy with liquid nitrogen
   b) Laser surgery
   c) Topical therapy with 10% podophyllin, 0.5% podophyllotoxin (podofilox), or 5% 5-fluorouracil cream
   d) Intraleisional interferon
5. A quadrivalent vaccine against HPV types 6, 11, 16, and 18 is efficacious and recommended for girls and women 9 to 26 years of age.
6. Molluscum contagiosum is a rarer form of venereal warts resulting from a poxvirus (seen mainly in patients with advanced AIDS).