Vocabulary Review
1. **Albuminuria**: The abnormal presence of albumin in the urine.
2. **Azotemia**: Retention in the blood of excessive amounts of nitrogenous wastes.
3. **Casts**: Fibrous or protein material that is molded to the shape of the part in which it has accumulated and is thrown off into the urine in kidney disease.
4. **Copulation**: Sexual intercourse.
5. **Erythropoietin**: A substance released from the kidneys and liver that promotes red blood cell formation.
6. **Urgency**: A sudden, compelling desire to urinate and the inability to control the release of urine.
7. **Urology**: The study of the urinary tract in both male and female patients.
8. Inflammation of the urethra—urethritis
9. Infection of the urinary bladder—cystitis
10. Inflammation of the renal pelvis and kidney—pyelonephritis
11. Degenerative inflammation of the glomeruli—glomerulonephritis
12. **Creatinine**: Nitrogenous wastes from muscle metabolism that are excreted in the urine.
13. **BUN**: Blood urea nitrogen; a blood test to detect renal disease.
14. **UA**: Urinalysis; a common laboratory examination used to diagnose and evaluate diseases in multiple body systems.
15. **PSA**: Prostate-specific antigen.
16. **DRE**: Digital rectal exam.
17. a. Epididymis
18. h. Enuresis
19. i. Renal calculi
20. e. BPH
21. f. Cryptorchidism
22. d. Prostatitis
23. b. Balanitis
24. c. Impotence
25. g. Hydrocele

Skills and Concepts
1. a. Remove waste products from the body
   b. Help maintain homeostasis by regulating water, electrolytes, and acid-base levels
   c. Activate vitamin D, which is needed for calcium absorption
   d. Produce erythropoietin, which helps control the rate of red blood cell formation
   e. Help maintain blood pressure by secreting the enzyme renin
2. a. Filtration — passage of fluid and waste materials from the glomerulus to the Bowman’s capsule
   b. Reabsorption — absorption of fluid and other substances from the renal tubules
   c. Excretion — excretion of waste material in the form of urine
3. See Figure 40-1 on page 817 and Figure 40-2 on page 818 of the textbook.
4. Patients with weak pelvic musculature can develop stress incontinence. Pelvic muscle exercises (Kegel exercises) that strengthen the muscles of the pelvic floor are helpful for patients with stress incontinence. Patients are trained to simulate stopping the flow of urine and holding that contraction for 10 seconds, in sets of 20, three times a day.

5. Of the wide range of symptoms that occur in patients with disorders of the renal system, the most common symptoms involve changes in the frequency of urination. Dysuria (difficult or painful urination), urgency, retention, and incontinence are all common symptoms.

6. *Acute glomerulonephritis* develops about 2 weeks after a streptococcal infection; symptoms include low-grade fever, anorexia, general malaise, and flank pain. Hypertension and edema may occur because of reduced renal function. Urinalysis shows hematuria and proteinuria. Diuretics are given to control hypertension and reduce edema. The prognosis usually is good; some patients progress to a chronic state. *Chronic glomerulonephritis* develops over many years; it is associated with systemic lupus erythematosus and diabetes mellitus, and it causes progressive, irreversible nephron damage. The patient is asymptomatic until the disease progresses and more glomerular damage occurs; the patient then develops anorexia, fatigue, hypertension, hematuria, proteinuria, oliguria, and edema. Treatment is supportive and includes antihypertensives and diuretics and a low protein diet with limited sodium and potassium. Glomerulonephritis is one of the leading causes of kidney failure; ultimately, many patients require kidney dialysis. The only cure is kidney transplantation.

7. Polycystic kidney disease is an autosomal dominant genetic disorder. No indications of the disease are seen in children, but as time goes on, normal renal tissue in both kidneys is replaced by multiple benign cysts filled with fluid. As the cysts enlarge, they compress the surrounding tissue, causing necrosis, uremia, and renal failure. Symptoms do not usually become apparent until the individual reaches adolescence or adulthood. Patients with polycystic disease have a family history of kidney disease or renal failure, flank pain, hematuria, and hypertension. They are also more likely to develop UTIs and renal calculi. Because cyst formation is progressive, these patients eventually require either renal dialysis or kidney transplantation.

8. Wilms’ tumor is cancer of the kidney in children caused by a genetic defect. It is diagnosed most frequently at age 3 and rarely occurs after age 8.

9. Cryptorchidism is a condition in which the testicles do not descend. Normally, the testes develop in the abdominal cavity of the fetus and descend into the scrotum near the end of the pregnancy. Persistent cryptorchidism may cause infertility, and it increases the risk the boy will develop testicular cancer as an adolescent. Cryptorchidism is treated with orchiopexy, an outpatient laparoscopic procedure in which the undescended testicle is brought down and sutured into the scrotum.

10. a. Inguinal canal  
 b. Vas deferens  
 c. Epididymis  
 d. Testes

11. Answers may include:
- Most men have a PSA below 4; a level between 4 and 10 indicates a 25% chance of prostate cancer; a level higher than 10 increases the chance to 50%.
- Because there are many possible reasons for PSA elevation, if no other indicators of cancer are present, the physician may recommend repeating the DRE and PSA studies to see whether the level increases over time.
- If the PSA level increases with repeated testing or the DRE reveals an abnormal prostate, additional diagnostic studies should be done.
- If cancer is suspected, a biopsy (typically needle aspiration) is done.
- Part of the controversy over PSA testing is that it may diagnose a slow growing tumor that is not life threatening, which can result in life-changing surgery.
- The PSA test has a significant false-positive outcome (patients who do not have cancer are told they do). False-positive results lead to further diagnostic testing that is both expensive and stressful for the patient and his family. Only 25% to 30% of biopsies done because of elevated PSAs actually reveal cancer.
• It is not clear whether PSA screening saves lives or whether the benefits of screening outweigh the risks of follow-up diagnostic studies and cancer treatment for potentially slow-growing tumors that are not life threatening. The most frequent complications of prostate surgery are erectile dysfunction and urinary incontinence.

12. The extent of the prostate cancer dictates the treatment options, which may include the following:
• Radiation may be delivered directly to the cancer cells through external beam radiation therapy (EBRT), which uses high-powered x-rays to kill the cancer cells.
• An alternative procedure is radioactive seed implantation, a variant of radiation therapy. In this procedure, 40 to 100 rice-sized radioactive seeds are implanted directly into the prostate gland through a precisely placed hollow needle. The radiation is quite strong but has a very short range, so it destroys the tumor and minimizes damage to surrounding tissue.
• Testosterone can stimulate the growth of the tumor, so hormone therapy is frequently prescribed to block the action of testosterone or to stop its production.
• Surgical treatment options include removal of the prostate gland by transurethral resection; orchiectomy, in which the testosterone-producing testicles are removed; or radical prostatectomy, in which the prostate and local lymph nodes are removed. These are debilitating surgical procedures that have serious side effects and so are typically used as a last measure.
• As with all cancers, chemotherapy may be prescribed in advanced cases or in recurrences.

13. Gonorrhea and chlamydia organisms tend to coexist, so a patient who has tested positive for one of the organisms is typically treated for both. Symptoms are similar to those for urethritis and epididymitis, such as painful and frequent urination, discharge from the penis, and lower abdominal pain. Because chlamydia is resistant to penicillin, a regimen of antibiotics other than penicillin (e.g., Zithromax, doxycycline or erythromycin) is used. A syphilitic lesion, called a chancre, develops on the male genitalia, usually the penis, within a few days to a few weeks after exposure. Syphilis is initially diagnosed through either the VDRL or RPR antibody blood tests. If results of these are positive, the diagnosis is confirmed with a fluorescent Treponema absorption (FTA) test, which is specific for antibodies to the Treponema microorganism. It can be treated successfully with penicillin but may go unnoticed or unreported. Without treatment, syphilis advances to a secondary phase indicated by a low-grade fever, headache, sore throat, and a rash that does not itch but that can affect any part of the body. The secondary phase is highly contagious but is still treatable with penicillin. The more advanced stages of the disease can remain undetected or dormant for years.

14. AIDS is caused by the human immunodeficiency virus (HIV). The virus invades CD4 T lymphocytes, destroying their ability to fight infection on the cellular level. Opportunistic infections develop because of depressed T-cell counts. These include Pneumocystis carinii pneumonia, candidiasis (yeast infection), Kaposi’s sarcoma, dementia, and wasting syndrome. A patient is considered to be HIV positive when antibodies to the virus are detected but is not diagnosed with AIDS until the CD4 T-cell count is below 200 mm$^3$ (normal range from 600 to 1,000 mm$^3$) and/or opportunistic infections have been diagnosed. Current HIV management includes monitoring CD4 T-cell counts at diagnosis and every 3 to 6 months thereafter. All HIV tests screen for the presence of antibodies to the virus, and any positive result is followed up with the more definitive Western Blot test before a positive diagnosis is made. The most widely used screening test for HIV is the enzyme immunoassay (EIA or ELISA), which is typically performed on a venous blood sample. Other tests include OraQuick Advance HIV1/2 Antibody Test for use on both oral fluid and plasma specimens; and a home test called the Home Access HIV-1 Test System that provides the materials for collection of a blood specimen at home that is mailed to a laboratory.

15. Answers may include:
• Confidential HIV information includes any records that could reasonably identify the individual as a person who has had an HIV test, is HIV positive, has opportunistic diseases related to HIV, or has AIDS.
• HIPAA protects the patient’s confidential information, not just the paper or electronic records of that information. That means verbal disclosure of the individual’s HIV and AIDS status is limited to only the personnel who have the right to that information according to individual state laws. Disclosure of HIV and AIDS status for treatment, payment, or healthcare operations can be made only with the specific written consent of the affected patient.
Depending on state laws, written consent may not be needed to release HIV information if there is a court order for the information; if the case is being reported to state or local vital statistics or public health agencies; or to certain employees of correctional institutions or residential treatment facilities, funeral directors, or emergency personnel.

16. Refer to Table 40-1 in the text.

WORKPLACE APPLICATION OPTIONS

1. Hemodialysis is usually done in an outpatient clinic or hospital. The process uses an “artificial kidney” to filter out waste products in the blood and return the cleansed blood to the body. Hemodialysis is usually needed three times a week; the procedure takes approximately 3 to 4 hours. Peritoneal dialysis uses the capillaries in the peritoneal cavity to filter the blood by infusing the patient’s abdomen with dialyzing fluid that is inserted through a surgically implanted catheter with both entry and exit points. The highly concentrated dialyzing fluid attracts and absorbs waste products from the blood vessels and is then drained from the abdominal cavity by gravity into a container. This procedure can be done at home.

3. With genital herpes, the herpes simplex virus (HSV) enters the body through small breaks in the skin or mucous membranes. Most individuals with HSV are asymptomatic or signs and symptoms are so mild they go unnoticed. If symptoms are experienced, the first episode is typically the worst with the formation of a blistered, inflamed, painful rash on the penis, scrotum, and urethra. After several days the vesicles rupture, resulting in painful, ulcerated areas. The lesions heal in 3 to 4 weeks, but the herpes virus then migrates to a nerve dermatome. Many factors can reactivate the disease at any time (e.g., stress and upper respiratory infections), making the individual infectious again. HSV can be spread even when sores are not present. Genital warts are often asymptomatic in men and require preliminary treatment with acetic acid to be seen. The incubation period for infections from the human papillomavirus (HPV) may be as long as 6 months.