

CHAPTER 9

URINARY SYSTEM

CHAPTER CONTENTS

MEDIA LIBRARY	331
<hr/>	
LECTURE NOTES	
Objective 1: Combining forms and suffixes	332
Objective 2: Spelling and pronunciation	332
Objective 3: Urinary system organs	333
Objective 4: Nephron	334
Objective 5: Urine	335
Objective 6: Building terms	336
Objective 7: Vocabulary	337
Objective 8: Pathology	338
Objective 9: Diagnostic procedures	340
Objective 10: Therapeutic procedures	341
Objective 11: Pharmacology	342
Objective 12: Abbreviations	342
<hr/>	
WORKSHEETS	345
<hr/>	
QUIZZES	353
<hr/>	
ANSWER KEYS	367

MEDIA LIBRARY

Student DVD-ROM

- Twelve different interactive learning games
- Flash card generator
- Audio Glossary
- Professional Profile video—Registered dietician
- Body Rhythms
- Terminology Translator

Companion Website

- Multiple Choice, True/False, and Fill-in-the-Blank practice questions
- Labeling exercises
- Case study
- Additional Professional Profile information
- *New York Times* link for research into specific pathologies
- Web Destination activities
- Audio Glossary
- Link to VangoNotes
- Link to drug updates

IRDVD

- Animations
 - 3D interactive animation of urinary system anatomy
 - Blood flow into the glomerulus and production of filtrate
 - Catheterization
- Drag-and-drop labeling activity for urinary system anatomy
- Videos
 - Urinalysis
 - Renal failure
 - Kidney stones
 - Peritoneal dialysis
- Digital library of all figures from text chapter, labeled and unlabeled
- Test bank with 200 objective questions per chapter plus two short answer questions
- 20 classroom response questions
- PowerPoint presentation for classroom or online utilization

OBJECTIVE 1

Identify and define the combining forms and suffixes introduced in this chapter.

Text pages: 280; PowerPoint slides: 6–9

LECTURE NOTES

Combining Forms

azot/o
bacteri/o
cyst/o
glomerul/o
glycos/o
keton/o
lith/o
meat/o
nephro/o
noct/i
oligo/o
pyel/o
ren/o
ur/o
ureter/o
urethra/o
urin/o

Suffixes

-lith
-lithiasis
-ptosis
-tripsy
-uria

Meaning

nitrogenous waste
bacteria
bladder
glomerulus
sugar, glucose
ketones
stone
meatus
kidney
night
scanty
renal pelvis
kidney
urine
ureter; urinary tube
urethra
urine

Meaning

stone
condition of stones
drooping
surgical crushing
condition of the urine

TEACHING STRATEGIES

Medical Terminology Bee

- Create PowerPoint flash cards of new combining forms and suffixes presented in this chapter; have all students stand and then define word part; if student is correct, he or she remains standing; if student is wrong, he or she sits down; continue until only one student is standing.

LEARNING ACTIVITIES

Worksheet 9A

- New Combining Form and Suffix Handout

Text

- Practice Exercises

Student DVD-ROM

- Learning games
- Make flash cards

CW

- Practice questions

ASSESSMENTS

Quiz 9A—New Word Parts Quiz

Test Bank—Fill-in-the-Blank questions

OBJECTIVE 2

Correctly spell and pronounce medical terms and major anatomical structures relating to the urinary system.

LECTURE NOTES

Pronunciation for medical terms in this chapter can be found:

- In parentheses following key terms
- In the Audio Glossary on Student DVD-ROM
- In the Audio Glossary at Companion Website

TEACHING STRATEGIES

Emphasize to students:

- Importance of correctly spelling terms.
- How sounding out terms can assist in learning how to spell the terms.

Pop Questions

- Use Clicker questions as either a pretest or posttest quiz to gauge student comprehension of spelling strategies.

LEARNING ACTIVITIES

Worksheet 9B

- Medical Term Analysis

Terminology Checklist

- Can be used to practice pronunciation using the Audio Glossary as reference

Text

- Practice Exercises

Flash cards

- Look at the definition and write out/pronounce terms

Student DVD-ROM

- Audio Glossary
- Spelling Challenge game
- Crossword and Word Search puzzles

ASSESSMENTS

Quiz 9B—Spelling Quiz

Suggested terms:

1. azotemia
2. bacteriuria
3. calculus
4. calyx
5. catheterization
6. cystalgia
7. cystocele
8. diuretic
9. enuresis
10. genitourinary
11. glomerulus
12. pyelonephritis
13. lithotripsy
14. micturition
15. nephrolithiasis
16. nephroptosis
17. peritubular
18. ureterectasis
19. urethralgia
20. incontinence

Test Bank—questions

OBJECTIVE 3

Locate and describe the major organs of the urinary system and their functions.

Text pages: 282–285; PowerPoint slides: 10–20; 32–39

LECTURE NOTES

Kidneys

- Two kidneys located in lumbar region of back behind peritoneum; term for this location is *retroperitoneal*; main function is to filter and remove waste products from blood
- Internal structures include:
- Cortex—outer shell-like portion
 - Medulla—inner area
 - Pyramids—triangular-shaped structures visible in medulla

TEACHING STRATEGIES

Visual Aids

- Use full-size anatomical charts and models to illustrate organs.

Pop Questions

- Use Clicker questions as either a pretest or posttest quiz to gauge student comprehension during lecture.

- Papilla—tip of each renal pyramid
- Calyx—small open area that receives urine from each papilla
- Renal pelvis—large open area that receives urine from each calyx and empties into ureter

Ureters

- Urine drains down ureter from kidney into urinary bladder; ureters are very narrow tubes extending from renal pelvis to urinary bladder

Urinary Bladder

- Elastic muscular sac lying in base of pelvis; receives urine directly from ureters; stores urine and excretes it through urethra

Urethra

- Tubular canal carries urine from bladder to outside of body; external opening is called urinary meatus

IRDVD

- See PowerPoint presentation on the Instructor's Resource DVD for a 3D animation of urinary system organs.
- See PowerPoint presentation on the Instructor's Resource DVD for a drag-and-drop anatomy activity; display on screen and have students discuss and place labels during class.

LEARNING ACTIVITIES

Worksheet 9C

- Chapter Review

Text

- Labeling exercises 9.A & 9.B1
- Practice Exercises

Student DVD-ROM

- Labeling exercise
- Various questions in learning games

CW

- Labeling exercise
- Practice questions

Quizzes 9C & 9D

- May be used as worksheets

ASSESSMENTS

Quizzes 9C & 9D—Labeling Diagrams

Test Bank—questions

OBJECTIVE 4

Describe the nephron and the mechanisms of urine production.

Text pages: 285–286; PowerPoint slides: 21–31

LECTURE NOTES

Nephron

- Functional or working unit of kidney; each consists of renal corpuscle and renal tubule
- Renal corpuscle—double-walled cuplike structure called glomerular or Bowman's capsule; blood-filtering portion of nephron; capsule contains twisted group of capillaries called glomerulus
- Renal tubule divided into four areas: (1) proximal convoluted tubule, (2) loop of Henle, (3) distal convoluted tubule, (4) collecting tubule

Urine Production

- Three stages of urine production:
 - Filtration—first stage is filtering of blood; occurs in renal corpuscle; process of removing water, sugar, amino acids, electrolytes, and

TEACHING STRATEGIES

Visual Aids

- Use full-size anatomical charts and models to illustrate how nephron structure relates to its functioning.

Pop Questions

- Use Clicker questions as either a pretest or posttest quiz to gauge student comprehension during lecture.

IRDVD

- See PowerPoint presentation on the Instructor's Resource DVD for an animation illustrating blood flow into the glomerulus and the production of filtrate.

other materials from blood by moving fluid out of glomerulus and into Bowman's capsule

- Reabsorption—process begins after filtration when filtrate passes through four sections of tubule; as filtrate moves along its twisted journey, most water and some desirable substances, such as glucose and amino acids, are reabsorbed into bloodstream
- Secretion—final stage occurs when special cells of collecting tubules secrete ammonia, uric acid, and other substances directly into tubule; urine formation is now finished and it is passed from collecting tubules to renal pelvis

LEARNING ACTIVITIES

Worksheet 9C

- Chapter Review

Text

- Labeling exercise 9.B2
- Practice Exercises

Student DVD-ROM

- Various questions in learning games

CW

- Practice questions

ASSESSMENTS

Test Bank—questions

OBJECTIVE 5

Identify the characteristics of urine and a urinalysis.

Text pages: 286–287; PowerPoint slides: 40–43

LECTURE NOTES

Normal Urinalysis Findings

- | | |
|--------------------|------------------------------------------|
| • Color | Straw colored, pale yellow, to deep gold |
| • Odor | Aromatic |
| • Appearance | Clear |
| • Specific gravity | 1.010–1.030 |
| • pH | 5.0–8.0 |
| • Protein | Negative to trace |
| • Glucose | None |
| • Ketones | None |
| • Blood | Negative |

Implications of Abnormal Urinalysis

- **Color**—varies depending on patient's fluid intake and output or medication; brown or black color indicates serious disease process
- **Odor**—fetid or foul may indicate infection; fruity odor may be found in diabetes mellitus, dehydration, or starvation; other odors may be due to medication or foods
- **Appearance**—cloudiness may mean presence of infection
- **Specific gravity**—concentrated urine has higher specific gravity; dilute urine, such as with diabetes insipidus, acute tubular necrosis, or salt-restricted diets, has lower specific gravity
- **pH**—value below 7.0 (acidic) is common in urinary tract infections, metabolic or respiratory acidosis, diets high in fruits or vegetables, or administration of some drugs; higher than 7.0 (basic or alkaline) is common in metabolic or respiratory alkalosis, fever, high-protein diets, and when taking ascorbic acid
- **Protein**—may indicate glomerulonephritis or preeclampsia in pregnant woman

TEACHING STRATEGIES

- Review actual urinalysis report.

IRDVD

- See PowerPoint presentation on the Instructor's Resource DVD for video on the topics of Urinalysis and Specimen Collection.

Pop Questions

- Use Clicker questions as either a pretest or posttest quiz to gauge student comprehension during lecture.

LEARNING ACTIVITIES

Worksheet 9C

- Chapter Review

Text

- Practice Exercises

Student DVD-ROM

- Learning games

CW

- Practice questions

ASSESSMENTS

Test Bank—questions

- **Glucose**—small amounts may be present as result of eating high-carbohydrate meal, stress, pregnancy, and when taking some medications, such as aspirin or corticosteroids; higher levels may indicate poorly controlled diabetes, Cushing's syndrome, or infection
- **Ketones**—presence may indicate poorly controlled diabetes, dehydration, starvation, or ingestion of large amounts of aspirin
- **Blood**—may indicate some anemias; presence of certain medications (such as blood thinners); arsenic poisoning; reactions to transfusion, trauma, burns, and convulsions

OBJECTIVE 6

Build and define urinary system medical terms from word parts.

Text pages: 288–290; PowerPoint slides: 44–56

LECTURE NOTES

Combining

Form	Medical Term	Definition	
cyst/o	cystalgia	bladder pain	
	cystectomy	excision of bladder	
	cystogram	record of bladder	
	cystic	pertaining to bladder	
	cystitis	bladder inflammation	
	cystolith	bladder stone	
	cystostomy	create new opening into bladder	
	cystotomy	incision into bladder	
	cystopexy	surgical fixation of bladder	
	cystoplasty	surgical repair of bladder	
	cystorrhagia	rapid bleeding from bladder	
	cystoscope	instrument used to visually examine bladder	
	lith/o	lithotripsy	surgical crushing of a stone
		lithotomy	incision to remove a stone
nephro/o	nephrectomy	excision of a kidney	
	nephrogram	X-ray of kidney	
	nephritis	kidney inflammation	
	nephrolith	kidney stone	
	nephrologist	specialist in kidney	
	nephromalacia	softening of kidney	
	nephromegaly	enlarged kidney	
	nephroma	kidney tumor	
	nephrosis	abnormal kidney condition	
	nephroptosis	drooping kidney	
	nephrostomy	create new opening into kidney	
	nephrotomy	incision into kidney	
	nephropathy	kidney disease	
	nephropexy	surgical fixation of (floating) kidney	
nephrolithiasis	condition of kidney stones		
nephrosclerosis	hardening of the kidney		
pyelo/o	pyelogram	X-ray record of renal pelvis	
	pyelitis	renal pelvis inflammation	
	pyeloplasty	surgical repair of renal pelvis	

TEACHING STRATEGIES

- Reinforce how many words in the urinary system can be constructed from word parts.
- Read aloud urinary system words that are made up of word parts; have students identify parts and define terms, either aloud or individually on paper.
- Write sentences on the board using common words; have students substitute correct medical terms.

Pop Questions

- Use Clicker questions as either a pretest or posttest quiz to gauge student comprehension during lecture.

LEARNING ACTIVITIES

Worksheet 9B

- Medical Term Analysis

Worksheet 9C

- Chapter Review

Quiz 9E

- May be used as a worksheet

Text

- Practice Exercises
- Terminology Checklist

Student DVD-ROM

- Learning games
- Flash cards

CW

- Practice questions

ren/o	renal	pertaining to kidneys
ur/o	urologist	specialist in urinary system
	urology	study of urinary system
ureter/o	ureteral	pertaining to ureter
	ureterectasis	ureter dilation
	ureterolith	ureter stone
	ureterostenosis	narrowing of ureter
urethr/o	urethral	pertaining to the urethra
	urethralgia	urethra pain
	urethritis	urethra inflammation
	urethrorrhagia	rapid bleeding from urethra
	urethroscope	instrument to visually examine urethra
	urethrostenosis	narrowing of urethra
urin/o	urinometer	instrument to measure urine
	urinary	pertaining to urine
Suffix	Medical Term	Definition
-uria	anuria	condition of no urine (produced by kidney)
	bacteriuria	bacteria in urine
	dysuria	condition of difficult or painful urination
	glycosuria	condition of sugar in urine
	hematuria	condition of blood in urine
	ketonuria	ketones in urine
	nocturia	condition of frequent nighttime urination
	oliguria	condition of scanty amount of urine
	polyuria	condition of (too) much urine
	proteinuria	protein in urine
	pyuria	condition of pus in urine

ASSESSMENTS

Quiz 9E—Word Building Quiz

Quiz 9G—Chapter Review

Test Bank—questions

OBJECTIVE 7

Identify and define urinary system vocabulary terms.

Text pages: 290–291; PowerPoint slides: 57–61

LECTURE NOTES

anuria	complete suppression of urine formed by kidneys and a complete lack of urine excretion
azotemia	accumulation of nitrogenous waste in bloodstream; occurs when kidney fails to filter these wastes from blood
calculus	stone formed within organ by accumulation of mineral salts; found in kidney, renal pelvis, ureters, bladder, or urethra; plural is <i>calculi</i>
catheter	flexible tube inserted into body for purpose of moving fluids into or out of body; most commonly used in reference to a tube threaded through urethra into bladder to withdraw urine
diuresis	increased formation and secretion of urine

TEACHING STRATEGIES

- Write sentences on the board using common words; have students substitute correct medical terms.

Jeopardy Game

- Have students create questions for terms in this section for a Jeopardy game to be played in class—may be combined with Pathology, Diagnostic, and Therapeutic terms.

Pop Questions

- Use Clicker questions as either a pretest or posttest quiz to gauge student comprehension during lecture.

enuresis	involuntary discharge of urine after age by which bladder control should have been established; usually by age 5; also called bed-wetting at night
frequency	greater-than-normal occurrence in urge to urinate, without increase in total daily volume of urine; frequency is indication of inflammation of bladder or urethra
hesitancy	decrease in force of urine stream, often with difficulty initiating flow; often a symptom of a blockage along urethra, such as enlarged prostate gland
micturition	another term for urination
nephrology	branch of medicine involved in diagnosis and treatment of diseases and disorders of kidney; physician is <i>nephrologist</i>
renal colic	pain caused by kidney stone; can be excruciating pain and generally requires medical treatment
stricture	narrowing of passageway in urinary system
uremia	accumulation of waste products (especially nitrogenous wastes) in bloodstream; associated with renal failure
urgency	feeling need to urinate immediately
urinary incontinence	involuntary release of urine; in some patients indwelling catheter is inserted into bladder for continuous urine drainage
urinary retention	inability to fully empty bladder; often indicates blockage in urethra
urology	branch of medicine involved in diagnosis and treatment of diseases and disorders of urinary system; physician is a <i>urologist</i>
voiding	another term for urination

LEARNING ACTIVITIES

Worksheet 9C

- Chapter Review

Text

- Practice Exercises
- Terminology Checklist
- Medical Record Analysis
- Chart Note Transcription

Student DVD-ROM

- Learning games
- Flash cards

CW

- Practice questions
- Case Study

ASSESSMENTS

Quiz 9G—Chapter Review

Test Bank—questions

OBJECTIVE 8

Identify and define selected urinary system pathology terms.

Text pages: 291–293; PowerPoint slides: 62–69

LECTURE NOTES

Kidney

acute tubular necrosis (ATN)	damage to renal tubules due to presence of toxins in urine or to ischemia; results in oliguria
diabetic nephropathy	accumulation of damage to glomerulus capillaries due to chronic high blood sugars of diabetes mellitus
glomerulonephritis	inflammation of kidney (primarily of the glomerulus); since glomerular membrane is inflamed, it becomes more permeable and will allow protein and blood cells to enter filtrate; results in protein in urine (proteinuria) and hematuria
hydronephrosis	distention of renal pelvis due to urine collecting in kidney; often result of obstruction of ureter
nephrolithiasis	presence of calculi in kidney; usually begins with solidification of salts present in urine

TEACHING STRATEGIES

- Select two students to do 5-minute presentations of their Internet research in class.
- Write sentences on the board using common words; have students substitute correct medical terms.

Jeopardy Game

- Have students create questions for terms in this section for a Jeopardy game to be played in class — may be combined with Vocabulary, Diagnostic, & Therapeutic terms.

Pop Questions

- Use Clicker questions as either a pretest or posttest quiz to gauge student comprehension during lecture.

nephrotic syndrome (NS)	damage to glomerulus resulting in protein appearing in urine, proteinuria, and corresponding decrease in protein in bloodstream
nephroptosis	downward displacement of kidney out of normal location; commonly called <i>floating kidney</i>
polycystic kidneys	formation of multiple cysts within kidney tissue. Results in the destruction of normal kidney tissue and uremia
pyelonephritis	inflammation of renal pelvis and kidney; one of most common types of kidney disease; may be result of lower urinary tract infection that moved up to kidney by way of ureters; may be large quantities of white blood cells and bacteria in urine; blood (hematuria) may even be present in urine in this condition; can occur with any untreated or persistent case of cystitis
renal cell carcinoma	cancerous tumor that arises from kidney tubule cells
renal failure	inability of kidneys to filter wastes from blood resulting in uremia; may be acute or chronic; major reason for patient being placed on dialysis
Wilm's tumor	malignant kidney tumor found most often in children
Urinary Bladder	
bladder cancer	cancerous tumor that arises from cells lining bladder; major symptom is hematuria
bladder neck obstruction (BNO)	blockage of bladder outlet; often caused by enlarged prostate gland in males
cystocele	hernia or protrusion of urinary bladder into wall of vagina
interstitial cystitis	disease of unknown cause in which there is inflammation and irritation of bladder; most commonly seen in middle-aged women
neurogenic bladder	loss of nervous control that leads to retention; may be caused by spinal cord injury or multiple sclerosis
urinary tract infection (UTI)	infection, usually from bacteria, of any organ of urinary system; most often begins with cystitis and may ascend into ureters and kidneys; most common in women because of their shorter urethra

IRDVD

- See PowerPoint presentation on the Instructor's Resource DVD for video on the topics of renal failure and kidney stones

Visual Aids

- Obtain a copy of IVP film to show in class, possibly one displaying calculus.

LEARNING ACTIVITIES

Internet research

- Have students select a specific pathology and use Internet resources to research its symptoms, diagnosis, and treatments.

Worksheet 9C

- Chapter Review

Text

- Practice Exercises
- Terminology Checklist
- Medical Record Analysis
- Chart Note Transcription

Student DVD-ROM

- Learning games
- Flash cards

CW

- Practice questions
- Case Study
- Web Destination activity on kidney stones
- *New York Times* link for research into specific pathologies

ASSESSMENTS

Quiz 9G—Chapter Review

Test Bank—questions

OBJECTIVE 9

Identify and define selected urinary system diagnostic procedures.

Text pages: 293–294; PowerPoint slides: 70–76

LECTURE NOTES

Clinical Laboratory

Test

blood urea nitrogen (BUN) blood test to measure kidney function by level of nitrogenous waste (urea) in blood
clean catch specimen urine sample obtained after cleaning off urinary opening and catching or collecting sample in midstream (halfway through urination process) to minimize contamination from genitalia

creatinine clearance test of kidney function; creatinine is waste product cleared from bloodstream by kidneys; for test, urine is collected for 24 hours and amount of creatinine is compared to amount of creatinine remaining in bloodstream

urinalysis (U/A, UA) laboratory test consisting of physical, chemical, and microscopic examination of urine

urine culture and sensitivity (C & S) laboratory test of urine for bacterial infection; attempt to grow bacteria on culture medium in order to identify it and determine which antibiotics it is sensitive to

Diagnostic Imaging

cystography process of instilling contrast material or dye into bladder by catheter to visualize urinary bladder on X-ray

excretory urography (EU) injecting dye into bloodstream and taking X-ray to trace action of kidney as it excretes dye

intravenous pyelogram (IVP) injecting contrast medium into vein and then taking X-ray to visualize renal pelvis

kidneys, ureters, bladder (KUB) X-ray taken of abdomen demonstrating kidneys, ureters, and bladder without using any contrast dye; also called *flat-plate abdomen*

retrograde pyelogram diagnostic X-ray in which dye is inserted through urethra to outline bladder, ureters, and renal pelvis

voiding cystourethrography (VCUG) X-ray taken to visualize urethra while patient is voiding after contrast dye has been placed in bladder

Endoscopic

Procedure

cystoscopy visual examination of urinary bladder using instrument called *cystoscope*

TEACHING STRATEGIES

- Review an actual urine culture and sensitivity report.
- Write sentences on the board using common words; have students substitute correct medical terms.

IRDVD

- See PowerPoint presentation on the Instructor's Resource DVD for a video on the topic of urinalysis.

Jeopardy Game

- Have students create questions for terms in this section for a Jeopardy game to be played in class—may be combined with Vocabulary, Pathology, and Therapeutic terms.

Pop Questions

- Use Clicker questions as either a pretest or posttest quiz to gauge student comprehension during lecture.

LEARNING ACTIVITIES

Worksheet 9C

- Chapter Review

Text

- Practice Exercises
- Terminology Checklist
- Medical Record Analysis
- Chart Note Transcription

Student DVD-ROM

- Learning games
- Flash cards

CW

- Practice questions
- Case Study
- *New York Times* link for research into specific diagnostic procedures

ASSESSMENTS

Quiz 9G—Chapter Review

Test Bank—questions

OBJECTIVE 10

Identify and define selected urinary system therapeutic procedures.

Text pages: 294–296; PowerPoint slides: 77–84

LECTURE NOTES

Medical Treatments

catheterization

insertion of tube through urethra and into urinary bladder for purpose of withdrawing urine or inserting dye

extracorporeal shockwave

lithotripsy (ESWL)

hemodialysis (HD)

use of ultrasound waves to break up stones; process does not require invasive surgery
use of artificial kidney machine that filters blood of person to remove waste products; use of technique in patients who have defective kidneys is lifesaving

peritoneal dialysis

removal of toxic waste substances from body by placing warm chemically balanced solutions into peritoneal cavity; wastes are filtered out of blood across peritoneum; used in treating renal failure and certain poisonings

Surgical Treatments

lithotripsy

destroying or crushing stones in bladder or urethra

meatotomy

incision into meatus in order to enlarge opening of urethra

nephrolithotomy

surgical incision to directly remove stones from kidney

renal transplant

surgical placement of donor kidney

TEACHING STRATEGIES

- Write sentences on the board using common words; have students substitute correct medical terms.

Jeopardy Game

- Have students create questions for terms in this section for a Jeopardy game to be played in class—may be combined with Vocabulary, Pathology, and Diagnostic terms.

Pop Questions

- Use Clicker questions as either a pretest or posttest quiz to gauge student comprehension during lecture.

Visual Aids

- Purchase a Foley catheter kit from a medical supply house and illustrate how the balloon is inflated to anchor catheter in the bladder.

IRDVD

- See PowerPoint presentation on the Instructor's Resource DVD for video on the topics of catheterization and peritoneal dialysis.

Guest Speaker

- Invite a dialysis technician to speak to the class about hemodialysis and peritoneal dialysis.

LEARNING ACTIVITIES

Worksheet 9C

- Chapter Review

Text

- Practice Exercises
- Terminology Checklist
- Medical Record Analysis
- Chart Note Transcription

Student DVD-ROM

- Learning games
- Flash cards

CW

- Practice questions
- Case Study
- Web Destination activity on kidney transplants
- *New York Times* link for research into specific treatment procedures

ASSESSMENTS

Quiz 9G—Chapter Review

Test Bank—questions

OBJECTIVE 11

Identify and define selected medications relating to the urinary system.

Text page: 296; PowerPoint slide: 85

LECTURE NOTES

Classification	Action	Generic and Brand Names
Antibiotics	used to treat bacterial infections of urinary tract	ciprofloxacin, Cipro; nitrofurantoin, Macrobid
Antispasmodic	medication to prevent or reduce bladder muscle spasms	oxybutynin, Ditropan; neostigmine, Prostigmine
Diuretics	medication that increases volume of urine produced by kidneys; useful in treatment of edema, kidney failure, heart failure, and hypertension	furosemide, Lasix; spironolactone, Aldactone

TEACHING STRATEGIES

Pop Questions

- Use Clicker questions as either a pretest or posttest quiz to gauge student comprehension during lecture.

LEARNING ACTIVITIES

- Have students use a PDR and/or the Internet to look up additional information regarding these medications, such as dosage, side effects, and contraindications

Worksheet 9C

- Chapter Review

Text

- Practice Exercises
- Terminology Checklist

Student DVD-ROM

- Learning games
- Flash cards

CW

- Practice questions

ASSESSMENTS

Test Bank—questions

OBJECTIVE 12

Define selected abbreviations associated with the urinary system.

Text page: 297; PowerPoint slides: 86–90

LECTURE NOTES

AGN	acute glomerulonephritis
ARF	acute renal failure
ATN	acute tubular necrosis
BNO	bladder neck obstruction
BUN	blood urea nitrogen
C&S	culture and sensitivity
cath	catheterization
Cl ⁻	chloride
CRF	chronic renal failure
cysto	cystoscopic exam
ESRD	end-stage renal disease
ESWL	extracorporeal shockwave lithotripsy

TEACHING STRATEGIES

- Emphasize importance of learning abbreviations and their full meanings; point out how some abbreviations, such as UTI, I&O, and BUN are typically used rather than full terms.
- Write sentences on the board using medical terms; have students substitute correct abbreviations for the terms.
- Encourage students to add abbreviations to their flash cards.

EU	excretory urography
GU	genitourinary
HCO ₃ ⁻	bicarbonate
HD	hemodialysis
H ₂ O	water
I&O	intake and output
IVP	intravenous pyelogram
K ⁺	potassium
KUB	kidney, ureter, bladder
mL	milliliter
Na ⁺	sodium
NS	nephrotic syndrome
pH	acidity or alkalinity of urine
RP	retrograde pyelogram
SG, sp. gr.	specific gravity
U/A, UA	urinalysis
UC	urine culture
UTI	urinary tract infection
VCUG	voiding cystourethrography

Memory Game

- Have students assist in creating a memory game to be played in class.

Pop Questions

- Use Clicker questions as either a pretest or posttest quiz to gauge student comprehension during lecture.

LEARNING ACTIVITIES

Worksheet 9C

- Chapter Review

Quiz 9F

- May be used as a worksheet

Text

- Practice Exercises

Student DVD-ROM

- Learning games
- Flash cards

CW

- Practice questions

ASSESSMENTS

Quiz 9F—Abbreviations Quiz

Quiz 9G—Chapter Review

Test Bank—questions

Worksheet 9A

New Combining Form and Suffix Handout

Directions: For each combining form below, write out its meaning and then locate a new term from the chapter that uses the combining form or suffix.

Combining Forms	Meaning	Chapter Term	Meaning
1. azot/o	_____	_____	_____
2. bacteri/o	_____	_____	_____
3. cyst/o	_____	_____	_____
4. glomerul/o	_____	_____	_____
5. glycos/o	_____	_____	_____
6. keton/o	_____	_____	_____
7. lith/o	_____	_____	_____
8. meat/o	_____	_____	_____
9. nephr/o	_____	_____	_____
10. noct/i	_____	_____	_____
11. olig/o	_____	_____	_____
12. pyel/o	_____	_____	_____
13. ren/o	_____	_____	_____
14. ur/o	_____	_____	_____
15. ureter/o	_____	_____	_____
16. urethr/o	_____	_____	_____
17. urin/o	_____	_____	_____
18. vesic/o	_____	_____	_____
Suffixes			
19. -lith	_____	_____	_____
20. -lithiasis	_____	_____	_____
21. -ptosis	_____	_____	_____
22. -tripsy	_____	_____	_____
23. -uria	_____	_____	_____

Worksheet 9B

Medical Term Analysis

Directions: Below are terms built from word parts used in this chapter that are not analyzed in the Word Building Table. Many are built from word parts you have learned in previous chapters. Analyze each term presented below by listing and defining each of the word parts used to build each term.

Medical Term	Word Part Analysis
1. necrosis	_____ _____
2. antibiotic	_____ _____
3. azotemia	_____ _____
4. cystocele	_____ _____
5. cystography	_____ _____
6. cystoscopy	_____ _____
7. urography	_____ _____
8. glomerular	_____ _____
9. glomerulonephritis	_____ _____
10. hydronephrosis	_____ _____
11. intravenous	_____ _____

(Continued)

- 12. meatotomy _____

- 13. nephrolithotomy _____

- 14. nephrology _____

- 15. nephrotic _____

- 16. neurogenic _____

- 17. peritubular _____

- 18. polycystic _____

- 19. pyelonephritis _____

- 20. carcinoma _____

- 21. retroperitoneal _____

- 22. uremia _____

- 23. urinalysis _____

(Continued)

24. urography

25. urology

26. cystourethrography

Worksheet 9C

Chapter Review

Anatomy and Physiology

1. The organs of the urinary system are the _____, _____, _____, and _____.
2. The functional unit of the kidneys is the _____.
3. The main function of the urinary system is to _____.
4. The outer region of the kidney is the _____ and the inner region is the _____.
5. The renal corpuscle consists of the _____ and _____.
6. The kidneys are responsible for _____ or balance in the body.
7. The three stages of urine production are: _____, _____, and _____.
8. _____ indicates the amount of dissolved substances in the urine.
9. Urine is normally _____ colored and 95 percent _____.
10. Urine is carried from the kidneys to the bladder in the _____ and from the bladder to the outside of the body in the _____.

Word Building

Directions: Build a term that means:

1. excision of the bladder _____
2. bladder pain _____
3. surgical crushing of a stone _____
4. kidney softening _____
5. kidney tumor _____
6. kidney disease _____
7. ureter stone _____
8. narrowing of the urethra _____
9. condition of sugar in the urine _____
10. condition of pus in the urine _____

(Continued)

Matching

- | | | |
|-------|------------------------------|--------------------------------------------------|
| _____ | 1. calculus | a. protrusion of bladder into vaginal wall |
| _____ | 2. urgency | b. urinalysis |
| _____ | 3. enuresis | c. decrease in the force of the urine stream |
| _____ | 4. micturition | d. a flat abdomen X-ray |
| _____ | 5. hesitancy | e. commonly seen in children |
| _____ | 6. hydronephrosis | f. medication to increase urine volume |
| _____ | 7. nephroptosis | g. involuntary discharge of urine |
| _____ | 8. cystocele | h. artificial filtering waste from blood |
| _____ | 9. renal failure | i. may be caused by spinal cord injury |
| _____ | 10. Wilm's tumor | j. treatment for kidney stones |
| _____ | 11. neurogenic bladder | k. X-ray of renal pelvis |
| _____ | 12. hematuria | l. stone |
| _____ | 13. BUN | m. implantation of a donor kidney |
| _____ | 14. U/A | n. accumulation of urine in renal pelvis |
| _____ | 15. IVP | o. test that grows bacteria in a culture medium |
| _____ | 16. urine C&S | p. collects uncontaminated urine for testing |
| _____ | 17. kidneys, ureter, bladder | q. feeling need to urinate immediately |
| _____ | 18. cystoscopy | r. blood in the urine |
| _____ | 19. catheterization | s. medication to treat bacterial infection |
| _____ | 20. hemodialysis | t. floating kidney |
| _____ | 21. ESWL | u. insertion of a flexible tube into the bladder |
| _____ | 22. renal transplant | v. another term for urination |
| _____ | 23. clean catch specimen | w. blood test for kidney function |
| _____ | 24. antibiotic | x. visual exam of the bladder |
| _____ | 25. diuretic | y. inability of the kidneys to filter wastes |

Quiz 9A

New Word Parts Quiz

Directions: Define the combining form or suffix in the spaces provided.

1. azot/o _____
2. bacteri/o _____
3. cyst/o _____
4. glomerul/o _____
5. glycos/o _____
6. keton/o _____
7. lith/o _____
8. meat/o _____
9. nephr/o _____
10. noct/i _____
11. olig/o _____
12. pyel/o _____
13. ren/o _____
14. ur/o _____
15. ureter/o _____
16. urethr/o _____
17. urin/o _____
18. -lith _____
19. -lithiasis _____
20. -ptosis _____
21. -tripsy _____
22. -uria _____

Quiz 9B

Spelling Quiz

Directions: Write each term as your instructor pronounces it.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____

Quiz 9C

Labeling Diagram

Directions: Label the structures of the urinary system.

The diagram shows a human male torso and lower body with the urinary system highlighted. Five callout boxes provide detailed views of specific parts:

- 1.** A cross-section of a kidney showing the cortex, medulla with pyramids, and renal pelvis.
- 2.** A view of the bladder and ureters, showing the bladder's position and the ureters entering it.
- 3.** A view of the kidneys and ureters from a posterior perspective, showing their location relative to the spine and pelvis.
- 4.** A detailed view of the male urethra passing through the length of the penis.
- 5.** A cross-section of the ureter showing its internal structure, including the spiral folds of the inner lining (rugae).

Quiz 9E

Word Building Quiz

Directions: Build a single medical term for each phrase below.

1. bladder pain _____
2. bladder inflammation _____
3. bladder stone _____
4. surgical repair of the bladder _____
5. rapid bleeding from the bladder _____
6. instrument used to visually examine the bladder _____
7. condition of sugar in the urine _____
8. surgical crushing of a stone _____
9. softening of the kidney _____
10. kidney tumor _____
11. drooping kidney _____
12. surgical fixation of (floating) kidney _____
13. kidney disease _____
14. hardening of the kidney _____
15. condition of (frequent) nighttime urination _____
16. X-ray record of the renal pelvis _____
17. surgical repair of the renal pelvis _____
18. condition of pus in the urine _____
19. narrowing of a ureter _____
20. urethra inflammation _____
21. instrument to visually examine the urethra _____
22. condition of no urine (produced by kidney) _____
23. condition of difficult or painful urination _____
24. condition of blood in the urine _____
25. condition of (too) much urine _____

Quiz 9F

Abbreviations Quiz

Directions: Write the medical term for which each abbreviation stands.

1. AGN _____
2. ARF _____
3. ATN _____
4. BNO _____
5. BUN _____
6. cath _____
7. Cl⁻ _____
8. CRF _____
9. C&S _____
10. cysto _____
11. ESWL _____
12. EU _____
13. HD _____
14. H₂O _____
15. I&O _____
16. IVP _____
17. K⁺ _____
18. KUB _____
19. Na⁺ _____
20. RP _____
21. SG, sp. gr. _____
22. U/A, UA _____
23. UC _____
24. UTI _____
25. VCUG _____

Quiz 9G

Chapter Review

PART I: Multiple Choice

Directions: Circle the correct answer.

- Excision of a kidney is called
 - nephrectomy.
 - nephropexy.
 - nephrotomy.
 - renectomy.
- A distention of the renal pelvis due to urine collecting in the kidney, often the result of obstruction, is
 - nephrolithiasis.
 - hydronephrosis.
 - cystocele.
 - pyelonephritis.
- In nephromegaly there is
 - an enlargement in the kidney.
 - a stone present in the kidney.
 - an inflammation of the kidney.
 - a prolapse of the kidney.
- The abbreviation UTI stands for
 - urethral toxic infection.
 - ureter total inflammation.
 - urinary tract incontinence.
 - urinary tract infection.
- The medical term for abnormal kidney condition is
 - nephroptosis.
 - nephrosis.
 - nephromalacia.
 - nephritis.
- The act of voiding urine is called
 - nocturia.
 - micturition.
 - oliguria.
 - urodynia.
- What is inflammation of the bladder called?
 - nephritis
 - urinary tract infection
 - cystitis
 - pyelitis
- What is the use of an artificial kidney machine to filter the blood of a person to remove waste products called?
 - catheterization
 - hemodialysis
 - dwell time
 - BUN
- What is the medical term for ureteral narrowing?
 - ureterostenosis
 - ureterolysis
 - ureterosclerosis
 - urethrostenosis
- What is the functional unit of the kidney?
 - glomerulus
 - renal tubule
 - nephron
 - renal corpuscle

(Continued)

PART II: Matching

Directions: Match the term with its definition.

- | | | |
|-------|--------------|-------------------------------------|
| _____ | 1. polyuria | a. scanty amount of urine |
| _____ | 2. dysuria | b. condition of blood in urine |
| _____ | 3. pyuria | c. condition of too much urine |
| _____ | 4. oliguria | d. condition of ketones in urine |
| _____ | 5. nocturia | e. frequent nighttime urination |
| _____ | 6. enuresis | f. difficult urination |
| _____ | 7. hematuria | g. complete lack of urine secretion |
| _____ | 8. ketonuria | h. condition of pus in urine |
| _____ | 9. anuria | i. bed-wetting at night |

PART III: Abbreviations

Directions: Write the full meaning of the following abbreviations.

1. BUN _____
2. GU _____
3. IVP _____
4. KUB _____
5. CRF _____

Chapter 9 Answer Keys

Worksheet 9A Answer Key

1. nitrogenous waste
2. bacteria
3. urinary bladder
4. glomerulus
5. sugar, glucose
6. ketones
7. stone
8. meatus
9. kidney
10. night
11. scanty
12. renal pelvis
13. kidney
14. urine
15. ureter
16. urethra
17. urine
18. bladder
19. stone
20. condition of stones
21. drooping
22. surgical crushing
23. condition of the urine

Worksheet 9B Answer Key

1. necr/o = death; -osis = abnormal condition
2. anti- = against; bi/o = life; -tic = pertaining to
3. azot/o = nitrogenous waste; -emia = blood condition
4. cyst/o = bladder; -cele = hernia/protrusion
5. cyst/o = bladder; -graphy = process of recording
6. cyst/o = bladder; -scopy = process of viewing
7. ur/o = urine; -graphy = process of recording
8. glomerul/o = glomerulus; -ar = pertaining to
9. glomerul/o = glomerulus; nephr/o = kidney; -itis = inflammation
10. hydr/o = water; nephr/o = kidney; -osis = abnormal condition
11. intra- = within; ven/o = vein; -ous = pertaining to
12. meat/o = meatus; -otomy = incision
13. nephr/o = kidney; lith/o = stone; -otomy = incision
14. nephr/o = kidney; -ology = study of
15. nephr/o = kidney; -tic = pertaining to
16. neur/o = nerve; -genic = producing
17. peri- = around; tubule = not a standard word part; -ar = pertaining to
18. poly- = many; cyst = not a standard word part; -ic = pertaining to
19. pyel/o = renal pelvis; nephr/o = kidney; -itis = inflammation
20. carcin/o = cancer; -oma = tumor
21. retro- = backwards; peritone/o = peritoneum; -al = pertaining to
22. ur/o = urine; -emia = blood condition
23. urin/o = urine; -lysis = to break
24. ur/o = urine; -graphy = process of recording
25. ur/o = urine; -ology = study of
26. cyst/o = bladder; urethr/o = urethra; -graphy = process of recording

Worksheet 9C Answer Key

Anatomy and Physiology

1. kidneys, ureters, urinary bladder, and urethra
2. nephron
3. filter and remove waste from the blood
4. cortex; medulla
5. glomerulus; Bowman's (glomerular) capsule
6. homeostasis
7. filtration, reabsorption, and secretion
8. Specific gravity
9. straw; water
10. ureters; urethra

Word Building

1. cystectomy
2. cystalgia
3. lithotripsy
4. nephromalacia
5. nephroma
6. nephropathy
7. ureterolith
8. urethrostenosis
9. glycosuria
10. pyuria

Matching

1. l
2. q
3. g
4. v
5. c
6. n
7. t
8. a
9. y
10. e
11. i
12. r
13. w
14. b
15. k
16. o
17. d
18. x
19. u
20. h
21. j
22. m
23. p
24. s
25. f

Quiz 9A Answer Key

1. nitrogenous waste
2. bacteria
3. bladder
4. glomerulus
5. sugar, glucose
6. ketones
7. stone
8. meatus
9. kidney
10. night
11. scanty
12. renal pelvis
13. kidney
14. urine
15. ureter
16. urethra
17. urine
18. stone
19. condition of stones
20. drooping
21. surgical crushing
22. condition of the urine

Quiz 9B Answer Key

1. azotemia
2. bacteriuria
3. calculus
4. calyx
5. catheterization
6. cystalgia
7. cystocele
8. diuretic
9. enuresis
10. genitourinary
11. glomerulus
12. pyelonephritis
13. lithotripsy
14. micturition
15. nephrolithiasis
16. nephroptosis
17. peritubular
18. ureterectasis
19. urethralgia
20. incontinence

Quiz 9C Answer Key

1. kidney
2. urinary bladder
3. ureter
4. male urethra
5. female urethra

Quiz 9D Answer Key

1. cortex
2. medulla
3. calyx
4. renal pelvis
5. renal papilla
6. renal pyramid
7. ureter

Quiz 9E Answer Key

1. cystalgia
2. cystitis
3. cystolith
4. cystoplasty
5. cystorrhagia
6. cystoscope
7. glycosuria
8. lithotripsy
9. nephromalacia
10. nephroma
11. nephroptosis
12. nephropexy
13. nephropathy
14. nephrosclerosis
15. nocturia
16. pyelogram
17. pyeloplasty
18. pyuria
19. ureterostenosis
20. urethritis
21. urethroscope
22. anuria
23. dysuria
24. hematuria
25. polyuria

Quiz 9F Answer Key

1. acute glomerulonephritis
2. acute renal failure
3. acute tubular nephrosis
4. bladder neck obstruction
5. blood urea nitrogen
6. catheterization
7. chloride
8. chronic renal failure
9. culture and sensitivity
10. cystoscopy
11. end-stage renal disease
12. extracorporeal shockwave lithotripsy
13. excretory urography
14. genitourinary
15. bicarbonate
16. hemodialysis
17. water
18. input and output
19. intravenous pyelogram
20. potassium
21. kidneys, ureters, bladder
22. milliliter
23. sodium
24. nephrotic syndrome
25. acidity or alkalinity
26. retrograde pyelogram
27. specific gravity
28. urinalysis
29. urine culture
30. urinary tract infection
31. voiding cystourethrography

Quiz 9G Answer Key

Multiple Choice

- | | |
|------|-------|
| 1. A | 6. B |
| 2. B | 7. C |
| 3. A | 8. B |
| 4. D | 9. A |
| 5. B | 10. C |

Matching

- | | |
|------|------|
| 1. c | 6. i |
| 2. f | 7. b |
| 3. h | 8. d |
| 4. a | 9. g |
| 5. e | |

Abbreviations

- | | |
|--------------------------|-----------------------------|
| 1. blood urea nitrogen | 4. kidneys, ureter, bladder |
| 2. genitourinary | 5. chronic renal failure |
| 3. intravenous pyelogram | |