Chapter 11
Endocrine System

Chapter Contents

Media Library

Student DVD-ROM

- Twelve different interactive learning games
- Flash card generator
- Audio Glossary
- Professional Profile video—Speech-Language Pathology
- 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

- Animation
  - 3D interactive animation of Endocrine System glands
- Drag-and-drop labeling activity
  - Endocrine System glands
- Video
  - Diabetes
- 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 page: 356; PowerPoint slides: 6–9

LECTURE NOTES

Combining Forms

acr/o	extremities
adren/o	adrenal glands
adrenal/o	adrenal glands
andr/o	male
calc/o	calcium
crin/o	secrete
estr/o	female
glyc/o	sugar
glycos/o	sugar
gonad/o	sex glands
home/o	sameness
kal/i	potassium
natr/o	sodium
ophthalm/o	eye
pancreat/o	pancreas
parathyroid/o	parathyroid gland
pineal/o	pineal gland
pituitar/o	pituitary gland
thym/o	thymus gland
thyr/o	thyroid gland
thyroid/o	thyroid gland
toxic/o	poison

Suffixes

-crine	to secrete
-dipsia	thirst
-prandial	relating to a meal
-tropin	stimulate

TEACHING STRATEGIES

- Encourage/remind students to add new word parts to their flash cards

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 11A

- New Combining Form and Suffix Handout

Worksheet 11B

- Medical Term Analysis

Quiz 11A

- May be used as worksheet

Text

- Practice Exercises

Student DVD-ROM

- Learning games
- Make flash cards

CW

- Practice questions

ASSESSMENTS

Quiz 11A—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 endocrine 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.

Say each new term in class and have students repeat it.

Pop Questions

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

Learning Activities

Worksheet 11B

- 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 11B—Spelling Quiz
Suggested terms:

1. homeostasis
2. luteinizing
3. Langerhans
4. circadian
5. thalamus
6. adrenocorticotropin
7. testosterone
8. triiodothyronine
9. exophthalmos
10. gynecomastia
11. hirsutism
12. pheochromocytoma
13. ketoacidosis
14. insulinoma
15. Recklinghausen
16. panhypopituitarism
17. cretinism
18. thyrotoxicosis
19. radioimmunoassay
20. adrenalectomy

Test Bank—questions

OBJECTIVE 3

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

Text pages: 358–366; PowerPoint slides: 10–48

LECTURE NOTES

- Collection of **glands** that secrete **hormones** directly into bloodstream
- Hormones are chemicals that act on **target organs** to either increase or decrease target's activity level; in this way endocrine system is instrumental in maintaining **homeostasis**, adjusting activity level of most of tissues and organs of body to maintain stable internal environment
- Body actually has two distinct types of glands: **exocrine glands** and **endocrine glands**
- Exocrine glands release secretions into duct that carries them to outside of body; for example, sweat glands release sweat into sweat duct that travels to surface of body
- Endocrine glands release hormones directly into bloodstream; for example, thyroid gland secretes its hormones directly into bloodstream; because endocrine glands have no ducts, also referred to as *ductless glands*
- Consists of two **adrenal glands**, two **ovaries** in female, four **parathyroid glands**, **pancreas**, **pineal gland**, **pituitary gland**, two **testes** in male, **thymus gland**, and **thyroid gland**

Adrenal Glands

- Two adrenal glands
- Located above each kidneys (see ■ Figure 11.1)
- Each gland is composed of two sections: **adrenal cortex** and **adrenal medulla**
- Outer adrenal cortex manufactures several different families of hormones: **mineralocorticoids**, **glucocorticoids**, and **steroid sex hormones**
- All hormones secreted by adrenal cortex are steroid hormones; collectively referred to as **corticosteroids**
- Example of mineralocorticoid hormones is **aldosterone**; regulates sodium (Na^+) and potassium (K^+) levels in body
- Example of glucocorticoid hormones is **cortisol**; regulates carbohydrates in body
- Adrenal cortex of both men and women secretes steroid sex hormones: **androgens**, **estrogen**, and **progesterone**; hormones regulate secondary sexual characteristics
- Inner adrenal medulla is responsible for secreting hormones **epinephrine**, also called **adrenaline**, and **norepinephrine**; hormones are critical during emergency situations because they increase blood pressure, heart rate, and respiration levels; helps body perform better during emergencies or otherwise stressful times

Ovaries

- Two ovaries are located in lower abdominopelvic cavity of female (see ■ Figure 11.2)
- Female **gonads**; organs that produce **gametes** or reproductive sex cells; in females, gametes are **ova**; of importance to endocrine system, ovaries produce female sex hormones, **estrogen** and **progesterone**

TEACHING STRATEGIES

Visual Aids

- Use full-size anatomical charts and models to illustrate the location of different endocrine glands and their target organs.

IRDVD

- See PowerPoint presentation on the Instructor's Resource DVD for a 3D animation showing the endocrine glands.
- See PowerPoint presentation on the Instructor's Resource DVD for a drag-and-drop endocrine gland activity; display on screen and have students discuss and place labels during class.

Pop Questions

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

LEARNING ACTIVITIES

Group Activity

- Divide class into groups and assign each group a gland; have each group study conditions due to hypersecretion and hyposecretion of its hormones; list signs and symptoms of each; activity is applicable for Objectives 3 and 4.

Worksheet 11C

- Chapter Review

Text

- Labeling exercises 11.A, 11.B1, & 11.B2
- Practice Exercises

Student DVD-ROM

- Labeling exercise
- Learning games

CW

- Labeling exercise
- Practice questions

Quizzes 11C & 11D

- May be used as worksheets

ASSESSMENTS

Quizzes 11C & 11D—Labeling Diagrams
Test Bank—questions

- Estrogen is responsible for appearance of female sexual characteristics and regulation of **menstrual cycle**; progesterone helps maintain suitable uterine environment for pregnancy

Pancreas

- Pancreas located along lower curvature of stomach (see ■ Figure 11.3A)
- Only organ in body that has both endocrine and exocrine functions; exocrine portion of pancreas releases digestive enzymes through duct into duodenum; endocrine sections of pancreas, **islets of Langerhans**; islets cells produce two different hormones: **insulin** and **glucagon** (see ■ Figure 11.3B)
- Insulin, produced by beta (β) islet cells, stimulates cells of body to take in glucose from bloodstream, lowering blood sugar level; occurs after you have eaten meal and abosrbed carbohydrates into your bloodstream; cells obtain glucose they need for cellular respiration
- Another set of islet cells, alpha (α) cells, secrete different hormone, glucagon; stimulates liver to release glucose, thereby raising blood glucose level; glucagon is released when body needs more sugar, such as at beginning of strenuous activity or several hours after last meal has been digested
- Insulin and glucagon have opposite effects on blood sugar level; insulin will reduce blood sugar level, while glucagon will increase it

Parathyroid Glands

- Four tiny parathyroid glands located on dorsal surface of thyroid gland (see ■ Figure 11.4)
- **Parathyroid hormone** (PTH) secreted by these glands regulates amount of **calcium** in blood
- If blood calcium levels fall too low, parathyroid hormone levels in blood are increased; stimulates bone breakdown to release more calcium into blood

Pineal Gland

- Small pine cone-shaped gland that is part of **thalamus** region of brain (see ■ Figure 11.5)
- Secretes **melatonin**, hormone not well understood, but plays role in regulating body's **circadian rhythm**; the 24-hour clock that governs our periods of wakefulness and sleepiness

Pituitary Gland

- Located underneath brain (see ■ Figure 11.6); small marble-shaped gland divided into **anterior lobe** and **posterior lobe**; both lobes are controlled by **hypothalamus**, region of brain active in regulating automatic body responses
- Anterior pituitary secretes several different hormones (see ■ Figure 11.7)
- **Growth hormone** (GH), also called **somatotropin**, promotes growth of body by stimulating cells to rapidly increase in size and divide
- **Thyroid-stimulating hormone** (TSH) regulates function of thyroid gland
- **Adrenocorticotropin hormone** (ACTH) regulates function of adrenal cortex
- **Prolactin** (PRL) stimulates milk production in breast following pregnancy and birth

- **Follicle-stimulating hormone** (FSH) and **luteinizing hormone** (LH) both exert their influence on male and female gonads; these two hormones together are referred to as **gonadotropins**; follicle-stimulating hormone is responsible for development of ova in ovaries and sperm in testes; also stimulates ovary to secrete estrogen; luteinizing hormone stimulates secretion of sex hormones in both males and females and plays role in releasing ova in females
- **Melanocyte-stimulating hormone** (MSH) stimulates melanocytes to produce more melanin, thereby darkening skin
- Posterior pituitary secretes two hormones, **antidiuretic hormone** (ADH) and **oxytocin**
- Antidiuretic hormone promotes water reabsorption by kidney tubules
- Oxytocin stimulates uterine contractions during labor and delivery; after birth release of milk from mammary glands

Testes

- Two oval glands located in scrotal sac of male (see ■ Figure 11.8)
- Male gonads, produce male gametes, **sperm**, and male sex hormone, **testosterone**; testosterone produces male secondary sexual characteristics and regulates sperm production

Thymus Gland

- In addition to role as part of immune system, thymus also one of endocrine glands
- Secretes hormone **thymosin**
- Thymosin important for proper development of immune system
- Located in mediastinal cavity anterior and superior to heart (see ■ Figure 11.9)
- Present at birth and grows to its largest size during puberty; at puberty it begins to shrink and eventually is replaced with connective and adipose tissue
- Function is development of immune system in newborn; essential to growth and development of thymic lymphocytes or **T cells**, which are critical for body's immune system

Thyroid Gland

- Resembles butterfly in shape, has right and left lobes (see ■ Figure 11.10)
- Located on either side of trachea and larynx; thyroid cartilage, or Adam's apple, is located just above thyroid gland
- Produces hormones **thyroxine** (T_4) and **triiodothyronine** (T_3); produced from mineral **iodine**; help regulate production of energy and heat in body to adjust body's metabolic rate
- Also secretes **calcitonin** in response to hypercalcemia (too high blood calcium level); action is opposite of parathyroid hormone; stimulates increased deposition of calcium into bone, thereby lowering blood levels of calcium

OBJECTIVE 4

List the major hormones secreted by each endocrine gland and describe their functions.

Text pages: 358–359; PowerPoint slides: 10–48

LECTURE NOTES

Gland and Hormone	Function
Adrenal Cortex	
Glucocorticoids—Cortisol	regulate carbohydrate levels in the body
Mineralocorticoids—Aldosterone	regulate electrolytes and fluid volume in body
Steroid sex hormones—Androgen, estrogen, progesterone	responsible for reproduction and secondary sexual characteristics
Adrenal Medulla	
Epinephrine (adrenaline)	intensifies response during stress; "fight-or-flight" response
Norepinephrine	chiefly a vasoconstrictor
Ovaries	
Estrogen	stimulates development of secondary sex characteristics in females; regulates menstrual cycle
Progesterone	prepares for conditions of pregnancy
Pancreas	
Glucagon	stimulates liver to release glucose into blood
Insulin	regulates and promotes entry of glucose cells
Parathyroid Glands	
Parathyroid hormone (PTH)	stimulates bone breakdown; regulates calcium level in blood
Pituitary Anterior Lobe	
Adrenocorticotropin hormone (ACTH)	regulates function of adrenal cortex
Follicle-stimulating hormone (FSH)	stimulates growth of eggs in female and sperm in males
Growth hormone (GH)	stimulates growth of body
Luteinizing hormone (LH)	regulates function of male and female gonads; plays role in releasing ova in females
Melanocyte-stimulating hormone (MSH)	stimulates pigment in skin
Prolactin	stimulates milk production
Thyroid-stimulating hormone (TSH)	regulates function of thyroid gland
Pituitary Posterior Lobe	
Antidiuretic hormone (ADH)	stimulates reabsorption of water by kidneys
Oxytocin	stimulates uterine contractions and releases milk into ducts

TEACHING STRATEGIES

Pop Questions

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

LEARNING ACTIVITIES

Group Activity

- Divide the class into groups and assign each group a gland; have each group the conditions due to hypersecretion and hyposecretion of its hormones; list signs and symptoms of each; activity is applicable for Objectives 3 and 4.

Worksheet 11C

- Chapter Review

Text

- Practice Exercises

Student DVD-ROM

- Learning games

CW

- Practice questions

ASSESSMENTS

Quiz 11G—Chapter Review
Test Bank—questions

Testes	
Testosterone	promotes sperm production and development of secondary sex characteristics in males
Thymus	
Thymosin	promotes development of cells in immune system
Thyroid Gland	
Calcitonin	stimulates deposition of calcium into bone
Thyroxine (T_4)	stimulates metabolism in cells
Triiodothyronine (T_3)	stimulates metabolism in cells

OBJECTIVE 5

Build and define endocrine system medical terms from word parts.

Text pages: 366–368; PowerPoint slides: 49–54

LECTURE NOTES

Combining Form	Medical Term	Definition
adren/o	adrenal	pertaining to adrenal glands
	adrenomegaly	enlarged adrenal gland
	adrenopathy	adrenal gland disease
adrenal/o	adrenalectomy	removal of adrenal glands
	adrenalitis	inflammation of adrenal gland
calc/o	hypercalcemia	excessive calcium in blood
	hypocalcemia	low calcium in blood
crin/o	endocrinologist	specialist in endocrine system
	endocrinopathy	endocrine system disease
glyc/o	hyperglycemia	excessive sugar in blood
	hypoglycemia	low sugar in blood
kal/i	hyperkalemia	excessive potassium in blood
natr/o	hyponatremia	low sodium in blood
parathyroid/o	parathyroidal	pertaining to parathyroid gland
	parathyroidectomy	removal of parathyroid gland
	hyperparathyroidism	state of excessive parathyroid
	hypoparathyroidism	state of insufficient parathyroid
pancreat/o	pancreatic	pertaining to pancreas
pituitar/o	pituitary	pertaining to pituitary gland
	hypopituitarism	state of insufficient pituitary
	hyperpituitarism	state of excessive pituitary
thym/o	thymic	pertaining to thymus gland
	thymectomy	removal of thymus
	thymitis	thymus inflammation
	thymoma	thymus tumor

TEACHING STRATEGIES

- Reinforce how many endocrine system terms can be constructed from word parts.
- Read aloud chapter terms 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 11A

- New Combining Form and Suffix Handout

Worksheet 11B

- Medical Term Analysis

Worksheet 11C

- Chapter Review

Quiz 11E

- May be used as a worksheet

Text

- Practice Exercises
- Terminology Checklist

thyr/o	thyromegaly	enlarged thyroid
thyroid/o	thyroidal	pertaining to thyroid gland
	thyroidectomy	removal of thyroid gland
	hyperthyroidism	state of excessive thyroid
	hypothyroidism	state of insufficient thyroid

Suffix	Medical Term	Definition
-dipsia	polydipsia	many (excessive) thirst
-uria	polyuria	condition of (too) much urine
	glycosuria	sugar in the urine

Student DVD-ROM
- Learning games
- Flash cards

CW
- Practice questions

Assessments

Quiz 11E—Word Building Quiz
Quiz 11G—Chapter Review
Test Bank—questions

Objective 6

Identify and define endocrine system vocabulary terms.

Text page: 368; PowerPoint slides: 55–57

Lecture Notes

Term	Definition
acidosis	excessive acidity of body fluids due to accumulation of acids, as in diabetic acidosis
edema	body tissues contain excessive amounts of fluid
endocrinology	branch of medicine involving diagnosis and treatment of conditions and diseases of endocrine glands; physician is *endocrinologist*
exophthalmos	condition in which eyeballs protrude, such as in Graves' disease; generally caused by overproduction of thyroid hormone
gynecomastia	development of breast tissue in males; may be symptom of adrenal feminization
hirsutism	condition of having excessive amount of hair; generally used to describe females who have adult male pattern of hair growth; can be result of hormonal imbalance
hypersecretion	excessive hormone production by endocrine gland
hyposecretion	deficient hormone production by endocrine gland
obesity	having abnormal amount of fat in body
syndrome	group of symptoms and signs that, when combined, present clinical picture of disease or condition

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.

Learning Activities

Worksheet 11C
- 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 11G—Chapter Review
Test Bank—questions

OBJECTIVE 7

Identify and define selected endocrine system pathology terms.

Text pages: 369–371; PowerPoint slides: 58–72

LECTURE NOTES

Term	Definition
Adrenal Glands	
Addison's disease	results from deficiency in adrenocortical hormones; increased pigmentation of skin, generalized weakness, and weight loss
adrenal feminization	development of female secondary sexual characteristics (such as breasts) in male; result of increased estrogen secretion by adrenal cortex
adrenal virilism	development of male secondary sexual characteristics (such as deeper voice and facial hair) in female; result of increased androgen secretion by adrenal cortex
Cushing's syndrome	set of symptoms results from hypersecretion of adrenal cortex; may be result of tumor of adrenal glands; may present symptoms of weakness, edema, excess hair growth, skin discoloration, and osteoporosis
pheochromocytoma	usually benign tumor of adrenal medulla that secretes epinephrine; symptoms include anxiety, heart palpitations, dyspnea, profuse sweating, headache, and nausea
Pancreas	
diabetes mellitus (DM)	chronic disorder of carbohydrate metabolism; results in hyperglycemia and glycosuria; two distinct forms of diabetes mellitus: *insulin-dependent diabetes mellitus* (IDDM) or *type 1*, and *non–insulin-dependent diabetes mellitus* (NIDDM) or *type 2*
diabetic retinopathy	secondary complication of diabetes that affects blood vessels of retina, resulting in visual changes and even blindness
insulin-dependent diabetes mellitus (IDDM)	also called *type 1 diabetes mellitus;* develops early in life when pancreas stops insulin production; patient must take daily insulin injections
insulinoma	tumor of islets of Langerhans cells of pancreas; secretes an excessive amount of insulin

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, and Therapeutic terms.

IRDVD

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

Pop Questions

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

LEARNING ACTIVITIES

Internet Research

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

Worksheet 11C

- 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 activities on hypopituitarism and diabetes mellitus
- *New York Times* link for research into specific pathologies

ASSESSMENTS

Quiz 11G—Chapter Review
Test Bank—questions

ketoacidosis	acidosis due to excess of acidic ketone bodies (waste products); serious condition requiring immediate treatment; can result in death for diabetic patient if not reversed; also called *diabetic acidosis*
non–insulin-dependent diabetes mellitus	also called *type 2 diabetes mellitus;* typically develops later in life; pancreas produces normal to high levels of insulin but cells fail to respond to it; patients may take oral hypoglycemics to improve insulin function, or may eventually have to take insulin
peripheral neuropathy	damage to nerves in lower legs and hands as result of diabetes mellitus; symptoms include either extreme sensitivity or numbness and tingling
Parathyroid Glands	
tetany	nerve irritability and painful muscle cramps resulting from hypocalcemia; hypoparathyroidism is one cause
Recklinghausen disease	excessive production of parathyroid hormone; results in degeneration of bones
Pituitary Gland	
acromegaly	chronic disease of adults; results in elongation and enlargement of bones of head and extremities; can also be mood changes; due to excessive amount of growth hormone in adult
diabetes insipidus (DI)	disorder caused by inadequate secretion of antidiuretic hormone by posterior lobe of pituitary gland; may be polyuria and polydipsia
dwarfism	condition of being abnormally short in height; may be result of hereditary condition or lack of growth hormone
gigantism	excessive development of body due to overproduction of growth hormone by pituitary gland in child or teenager; opposite of *dwarfism*
panhypopituitarism	deficiency in all hormones secreted by pituitary gland; often recognized because of problems with glands regulated by pituitary—adrenal cortex, thyroid, ovaries, and testes
Thyroid Gland	
cretinism	congenital condition in which lack of thyroid hormones; results in arrested physical and mental development
goiter	enlargement of thyroid gland
Graves' disease	results in overactivity of thyroid gland; can cause crisis situation; symptoms include exophthalmos and goiter; type of *hyperthyroidism*
Hashimoto's disease	chronic autoimmune form of thyroiditis; results in hyposecretion of thyroid hormones

myxedema	condition resulting from hyposecretion of thyroid gland in adult; symptoms can include anemia, slow speech, swollen facial features, edematous skin, drowsiness, and mental lethargy
thyrotoxicosis	condition resulting from marked overproduction of thyroid gland; symptoms include rapid heart action, tremors, enlarged thyroid gland, exophthalmos, and weight loss
All Glands	
adenocarcinoma	cancerous tumor in gland that is capable of producing hormones secreted by gland; one cause of hypersecretion pathologies

OBJECTIVE 8

Identify and define selected endocrine system diagnostic procedures.

Text pages: 371–372; PowerPoint slides: 73–76

LECTURE NOTES

Terms	Definition
Clinical Laboratory Tests	
blood serum test	blood test to measure level of substances such as calcium, electrolytes, testosterone, insulin, and glucose; used to assist in determining function of various endocrine glands
fasting blood sugar (FBS)	blood test to measure amount of sugar circulating throughout body after 12-hour fast
glucose tolerance test (GTT)	test to determine blood sugar level; measured dose of glucose given to patient either orally or intravenously; blood samples drawn at certain intervals to determine ability of patient to use glucose; used for diabetic patients to determine their insulin response to glucose
protein-bound iodine test (PBI)	Blood test to measure concentration of thyroxine (T_4) circulating in bloodstream; iodine becomes bound to protein in blood and can be measured; useful in establishing thyroid function
radioimmunoassay (RIA)	test used to measure levels of hormones in the plasma of blood
thyroid function test (TFT)	blood test used to measure levels of thyroxine, triiodothyronine, and thyroid-stimulating hormone in bloodstream to assist in determining thyroid function
total calcium	blood test to measure total amount of calcium to assist in detecting parathyroid and bone disorders

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 Therapeutic terms.

Pop Questions

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

LEARNING ACTIVITIES

Worksheet 11C

- 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

two-hour postprandial glucose tolerance test	blood test to assist in evaluating glucose metabolism; patient eats high carbohydrate diet and then fasts overnight before test; then blood sample is taken two hours after meal
Diagnostic Imaging	
thyroid echogram	ultrasound examination of thyroid that can assist in distinguishing thyroid nodule from cyst
thyroid scan	test in which radioactive iodine is administered that localizes in thyroid gland; gland can then be visualized with scanning device to detect pathology such as tumors

Assessments

Quiz 11G—Chapter Review
Test Bank—questions

Objective 9

Identify and define selected endocrine system therapeutic procedures.

Text page: 372; PowerPoint slides: 77–78

Lecture Notes

Term	Definition
Medical Procedures	
chemical thyroidectomy	dose of radioactive iodine is given to kill thyroid gland cells without having to actually do surgery
hormone replacement therapy	artificial replacement of hormones in patients with hyposecretion disorders; may be oral pills, injections, or adhesive skin patches
Surgical Procedures	
laparoscopic adrenalectomy	removal of adrenal gland through small incision in abdomen and using endoscopic instruments
lobectomy	removal of lobe from organ; in this case, one lobe of thyroid gland

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.

Learning Activities

Worksheet 11C

- 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 11G—Chapter Review
Test Bank—questions

Objective 10

Identify and define selected medications relating to the endocrine system.

Text page: 373; PowerPoint slides: 79–80

Lecture Notes

Classification	Action	Generic and Brand Names
antithyroid agents	blocks production of thyroid hormones in patients with hypersecretion disorders	methimazole, Tapazole; propylthiouracil
corticosteroids	strong anti-inflammatory action; used to treat severe chronic inflammatory diseases such as rheumatoid arthritis; long-term use has adverse side effects such as osteoporosis and symptoms of Cushing's disease; also used to treat adrenal cortex hyposecretion disorders such as Addison's disease	prednisone, Deltasone
human growth hormone therapy	hormone replacement therapy with human growth hormone; stimulates skeletal growth; treats children with abnormally short stature	somatropin, Genotropin; somatrem, Protropin
insulin	replaces insulin for type 1 diabetics or to treat severe type 2 diabetics	human insulin, Humulin L
oral hypoglycemic agents	causes decrease in blood sugar; not used for insulin-dependent patients	metformin, Glucophage; glipizide, Glucotrol
thyroid replacement hormone	hormone replacement therapy for patients with hypothyroidism or who have had thyroidectomy	levothyroxine, Levo-T; liothyronine, Cytomel
vasopressin	controls diabetes insipidus and promote reabsorption of water in kidney tubules	desmopressin acetate, Desmopressin; conivaptan, Vaprisol

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 11C

- Chapter Review

Text

- Practice Exercises
- Terminology Checklist

Student DVD-ROM

- Learning games
- Flash cards

CW

- Practice questions

Assessments

Quiz 11G—Chapter Review
Test Bank—questions

OBJECTIVE 11

Define selected abbreviations associated with the endocrine system.

Text page: 373; PowerPoint slides: 81–84

LECTURE NOTES

α	alpha
ACTH	adrenocorticotropin hormone
ADH	antidiuretic hormone
β	beta
BMR	basal metabolic rate
DI	diabetes insipidus
DM	diabetes mellitus
FBS	fasting blood sugar
FSH	follicle-stimulating hormone
GH	growth hormone
GTT	glucose tolerance test
IDDM	insulin-dependent diabetes mellitus
K^+	potassium
LH	luteinizing hormone
MSH	melanocyte-stimulating hormone
Na^+	sodium
NIDDM	non–insulin-dependent diabetes mellitus
NPH	neutral protamine Hagedorn (insulin)
PBI	protein-bound iodine
PRL	prolactin
PTH	parathyroid hormone
RAI	radioactive iodine
RIA	radioimmunoassay
T_3	triiodothyronine
T_4	thyroxine
TFT	thyroid function test
TSH	thyroid-stimulating hormone

TEACHING STRATEGIES

- Emphasize the importance of learning abbreviations and their full meanings; point out how some abbreviations, such as FBS, IDDM, ACTH, FSH, and RIA are typically used rather than full terms.
- Encourage students to add abbreviations to their flash cards.
- Write sentences on the board using common words; have students substitute correct abbreviations.

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 11C

- Chapter Review

Quiz 11F

- May be used as worksheet

Text

- Practice Exercises

Student DVD-ROM

- Learning games
- Flash cards

CW

- Practice questions

ASSESSMENTS

Quiz 11F—Abbreviations Quiz
Quiz 11G—Chapter Review
Test Bank—questions

Worksheet 11A

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. acr/o			
2. adren/o			
3. adrenal/o			
4. andr/o			
5. calc/o			
6. crin/o			
7. estr/o			
8. glyc/o			
9. glycos/o			
10. gonad/o			
11. home/o			
12. kal/i			
13. natr/o			
14. ophthalm/o			
15. pancreat/o			
16. parathyroid/o			
17. pineal/o			
18. pituitar/o			
19. thym/o			
20. thyr/o			
21. thyroid/o			
22. toxic/o			

(*Continued*)

Combining Forms	Meaning	Chapter Term	Meaning
Suffixes			
23. -crine	_____	_____	_____
24. -dipsia	_____	_____	_____
25. -prandial	_____	_____	_____
26. -tropin	_____	_____	_____

Worksheet 11B

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 and list and define the word parts used to build each term.

Medical Term	Word Part Analysis
1. endocrine	_____
	_____
2. homeostasis	_____
	_____
3. androgen	_____
	_____
4. estrogen	_____
	_____
5. adrenocorticotropin	_____
	_____
6. gonadotropin	_____
	_____
7. somatotropin	_____
	_____
8. endocrinology	_____
	_____
9. gynecomastia	_____
	_____
10. retinopathy	_____
	_____
11. neuropathy	_____
	_____

(*Continued*)

12. acromegaly _____

_____

13. panhypopituitarism _____

_____

14. thyrotoxicosis _____

_____

15. adenocarcinoma _____

_____

16. postprandial _____

_____

17. lobectomy _____

_____

Worksheet 11C

Chapter Review

Anatomy and Physiology

1. The endocrine system is a collection of _____ that secrete _____ directly into the bloodstream.
2. The adrenal glands are located directly above the _____ and are divided into a _____ and _____.
3. The female gonad is the _____, and the male gonad is the _____.
4. The _____ is the only endocrine gland that is both an exocrine and endocrine gland.
5. Parathyroid hormone is responsible for regulating the level of _____ in the bloodstream.
6. _____ from the pineal gland is responsible for regulating circadian rhythm.
7. Prolactin stimulates _____ production by the _____.
8. Follicle-stimulating hormone and luteinizing hormone are collectively referred to as _____.
9. Antidiuretic hormone and oxytocin are secreted by the _____.
10. Thyroid gland hormones are produced from the mineral _____.

Word Building

Directions: Build a term that means:

1. adrenal gland disease _____
2. excessive calcium in the blood _____
3. low sugar in the blood _____
4. state of excessive parathyroid _____
5. inflammation of pancreas _____
6. thymus tumor _____
7. state of insufficient thyroid _____
8. sugar in the urine _____
9. many (excessive) thirst _____
10. enlarged thyroid _____

(*Continued*)

Matching

_____	**1.** edema	**a.**	tumor of adrenal medulla
_____	**2.** exophthalmos	**b.**	secrete into a duct
_____	**3.** gynecomastia	**c.**	type 1 diabetes mellitus
_____	**4.** hirsutism	**d.**	a pituitary gland hormone
_____	**5.** syndrome	**e.**	breast development in a male
_____	**6.** virilism	**f.**	enlarged thyroid gland
_____	**7.** pheochromocytoma	**g.**	tumor of islets of Langerhans
_____	**8.** acidosis	**h.**	test using radioactive iodine
_____	**9.** diabetes mellitus	**i.**	tissues contain excessive amount of fluid
_____	**10.** IDDM	**j.**	short stature
_____	**11.** insulinoma	**k.**	lab test for sugar level of blood
_____	**12.** tetany	**l.**	development of male sex characteristics
_____	**13.** acromegaly	**m.**	bulging eyeballs
_____	**14.** dwarfism	**n.**	marked overproduction of thyroid hormones
_____	**15.** goiter	**o.**	enlargement of bones of extremities
_____	**16.** Hashimoto's disease	**p.**	measures levels of hormones in the blood
_____	**17.** thyrotoxicosis	**q.**	excessive amount of hair
_____	**18.** FBS	**r.**	ultrasound examination
_____	**19.** radioimmunoassay	**s.**	nerve irritability
_____	**20.** thyroid echogram	**t.**	treats diabetes insipidus
_____	**21.** thyroid scan	**u.**	group of symptoms occurring together
_____	**22.** vasopressin	**v.**	autoimmune form of thyroiditis
_____	**23.** hyperkalemia	**w.**	symptoms are hyperglycemia and glycosuria
_____	**24.** GH	**x.**	too much potassium in the blood
_____	**25.** exocrine	**y.**	excess acid in the body tissues

Name _____ Date _____ Score _____

Quiz 11A

New Word Parts Quiz

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

1. acr/o _____
2. adren/o _____
3. andr/o _____
4. calc/o _____
5. crin/o _____
6. estr/o _____
7. glycos/o _____
8. gonad/o _____
9. home/o _____
10. kal/i _____
11. natr/o _____
12. ophthalm/o _____
13. pancreat/o _____
14. parathyroid/o _____
15. pineal/o _____
16. pituitar/o _____
17. thym/o _____
18. adrenal/o _____
19. thyr/o _____
20. toxic/o _____
21. glyc/o _____
22. -crine _____
23. -dipsia _____
24. -prandial _____
25. -tropin _____

Name _____ Date _____ Score _____

Quiz 11B

Spelling Quiz

Directions: Write each term as your instructor pronounces it.

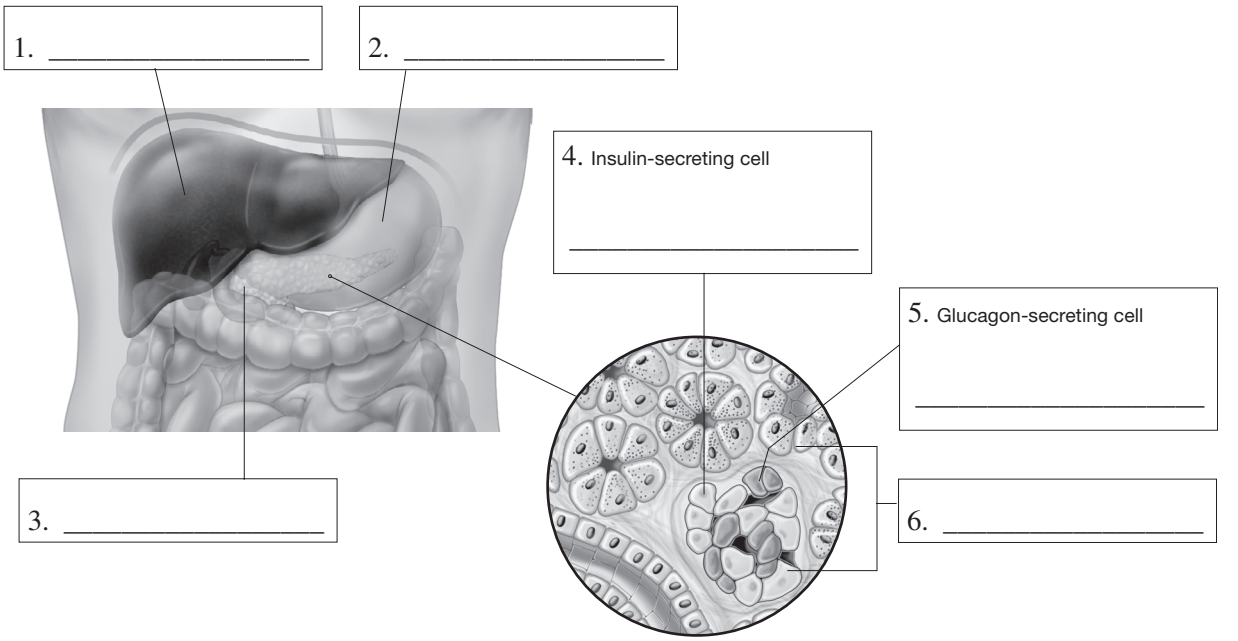
1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____

Name _____ Date _____ Score _____

Quiz 11C

Labeling Diagram

Directions: Label the glands of the endocrine system.

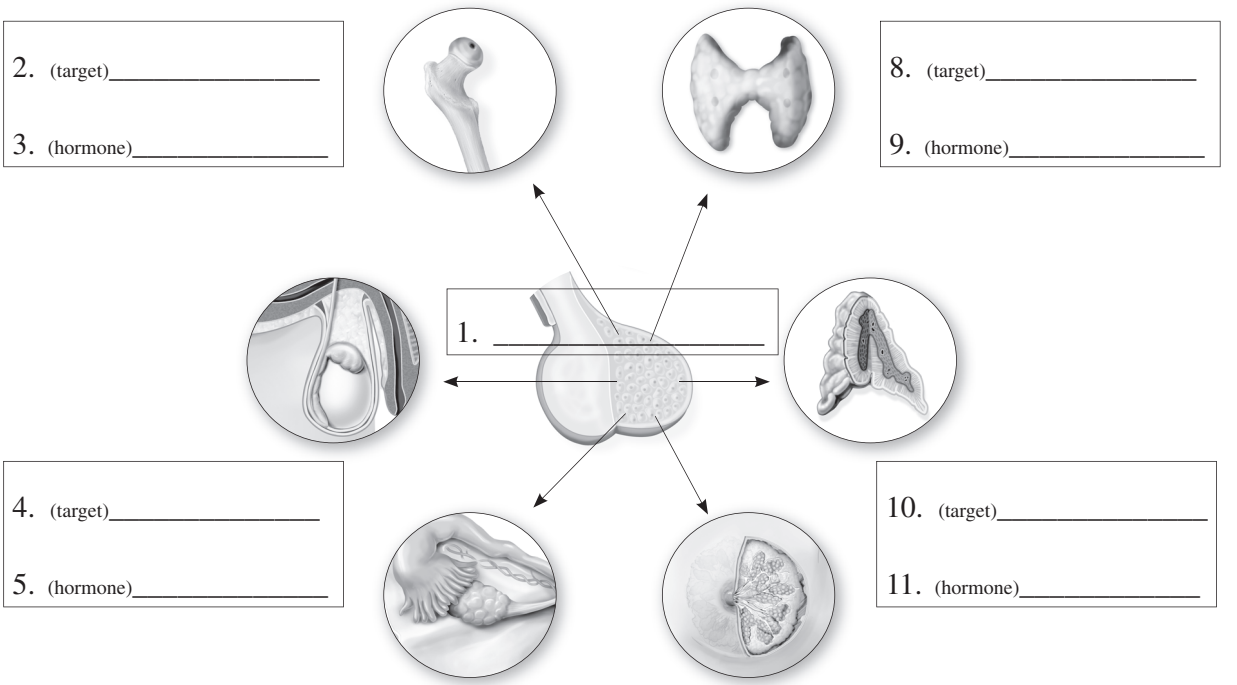


Name _____ Date _____ Score _____

Quiz 11D

Labeling Diagram

Directions: Label the hormones and target organs of the anterior pituitary gland.



Name _____ Date _____ Score _____

Quiz 11E

Word Building Quiz

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

1. thymus inflammation _____

2. pertaining to the parathyroid gland _____

3. pertaining to the pancreas _____

4. pertaining to the thymus gland _____

5. pertaining to the thyroid gland _____

6. removal of the thyroid _____

7. state of insufficient pituitary _____

8. low sodium in the blood _____

9. excessive potassium in the blood _____

10. specialist in the endocrine system _____

11. excessive calcium in the blood _____

12. low sugar in the blood _____

13. adrenal gland disease _____

14. enlarged extremities _____

15. condition of too much urine _____

Name _____ Date _____ Score _____

Quiz 11F

Abbreviations Quiz

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

1. ACTH _____
2. ADH _____
3. BMR _____
4. DI _____
5. DM _____
6. FBS _____
7. FSH _____
8. GH _____
9. GTT _____
10. IDDM _____
11. K^+ _____
12. Na^+ _____
13. α _____
14. PBI _____
15. PRL _____
16. PTH _____
17. RIA _____
18. T_3 _____
19. T_4 _____
20. TFT _____
21. TSH _____
22. NIDDM _____
23. β _____
24. LH _____
25. MSH _____

Name _____ Date _____ Score _____

Quiz 11G

Chapter Review

PART I: Multiple Choice

Directions: Circle the correct answer.

1. The hormone that aids the body in regulating carbohydrates is
- **a.** cortisol.
- **b.** epinephrine.
- **c.** aldosterone.
- **d.** oxytocin.

2. Which of the following is NOT an endocrine gland?
- **a.** thyroid
- **b.** pancreas
- **c.** pituitary
- **d.** lacrimal

3. Which hormone is NOT secreted by the anterior lobe of the pituitary gland?
- **a.** prolactin
- **b.** antidiuretic hormone
- **c.** thyroid-stimulating hormone
- **d.** growth hormone

4. Insulin-dependent diabetes mellitus is also known as
- **a.** type 1.
- **b.** Recklinghausen disease.
- **c.** type 2.
- **d.** myxedema.

5. The term hyperkalemia is defined as
- **a.** excess potassium in the blood.
- **b.** excess sugar in the blood.
- **c.** excess sodium in the blood.
- **d.** excess calcium in the blood.

6. The term for a condition of painful muscle cramps resulting from a low amount of calcium in the blood is
- **a.** myxedema.
- **b.** tetany.
- **c.** goiter.
- **d.** acidosis.

7. The term for the condition of having an excessive amount of hair is
- **a.** cretinism.
- **b.** syndrome.
- **c.** gynecomastia.
- **d.** hirsutism.

8. Thyroid function tests are
- **a.** tests in which a radioactive element is administered.
- **b.** blood test used to measure the levels of T_3, T_4, and TSH.
- **c.** ultrasound examination of the thyroid.
- **d.** procedure where the thyroid is destroyed.

9. The disease resulting from hypersecretion by the adrenal cortex is
- **a.** Addison's disease.
- **b.** Grave's disease.
- **c.** Cushing's syndrome.
- **d.** Hashimoto's disease.

10. Goiter is enlargement of the
- **a.** adrenal glands.
- **b.** pituitary gland.
- **c.** parathyroid glands.
- **d.** thyroid gland.

(*Continued*)

PART II: Matching

Directions: Match the term with its definition.

_____ **1.** growth hormone

_____ **2.** hormone replacement therapy

_____ **3.** protein-bound iodine test

_____ **4.** myxedema

_____ **5.** diabetic retinopathy

_____ **6.** gynecomastia

_____ **7.** edema

_____ **8.** glucagon

_____ **9.** antidiuretic hormone

_____ **10.** cretinism

a. test for thyroid function

b. excess body fluids

c. may result in blindness

d. secreted by the pancreas

e. hyposecretion of thyroid in children

f. treats children with abnormal short stature

g. secreted by the posterior pituitary gland

h. hyposecretion of thyroid in adults

i. symptom of adrenal feminization

j. treatment for hyposecretion disorders

PART III: Abbreviations

Directions: Write the full meaning of the following abbreviations.

1. IDDM _____

2. PBI _____

3. FBS _____

4. Na^+ _____

5. T_4 _____

Chapter 11 Answer Keys

Worksheet 11A Answer Key

1. extremities
2. adrenal glands
3. adrenal glands
4. male
5. calcium
6. secrete
7. female
8. sugar
9. sugar
10. sex glands
11. sameness
12. potassium
13. sodium
14. eye
15. pancreas
16. parathyroid gland
17. pineal gland
18. pituitary gland
19. thymus gland
20. thyroid gland
21. thyroid gland
22. poison

Suffixes

23. to secrete
24. thirst
25. relating to a meal
26. stimulate

Worksheet 11B Answer Key

1. endo- = within; -crine = to secrete
2. home/o = sameness; -stasis = standing still
3. andr/o = male; -gen = producing
4. estr/o = female; -gen = producing
5. adren/o = adrenal gland; cortic/o = cortex; -tropin = to stimulate
6. gonad/o = sex gland; -tropin = to stimulate
7. somat/o = body; -tropin = to stimulate
8. endo- = within; crin/o = to secrete; -logy = study of
9. gynec/o = female; mast/o = breast; -ia = condition
10. retin/o = retina; -pathy = disease
11. neur/o = nerve; -pathy = disease
12. acr/o = extremites; -megaly = enlarged
13. pan- = all; hypo- = deficient; pituitary/o = pituitary gland; -ism = state of
14. thyr/o = thyroid gland; toxic/o = poison; -osis = abnormal condition
15. aden/o = gland; carcin/o = cancer; -oma = tumor
16. post- = after; -prandial = pertaining to a meal
17. lob/o = lobe; -ectomy = surgical removal

Worksheet 11C Answer Key

Anatomy and Physiology

1. glands; hormones
2. kidneys; cortex, medulla
3. ovary; testis
4. pancreas
5. calcium
6. melatonin
7. milk; breasts
8. gonadotropins
9. posterior pituitary gland
10. iodine

Word Building

1. adrenopathy
2. hypercalcemia
3. hypoglycemia
4. hyperparathyroidism
5. pancreatitis
6. thymoma
7. hypothyroidism
8. glycosuria
9. polydipsia
10. thyromegaly

Matching

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

Quiz 11A Answer Key

1. extremities
2. adrenal glands
3. male
4. calcium
5. secrete
6. female
7. sugar
8. sex glands
9. sameness
10. potassium
11. sodium
12. eye
13. pancreas
14. parathyroid gland
15. pineal gland
16. pituitary gland
17. thymus gland
18. adrenal gland
19. thyroid gland
20. poison
21. sugar
22. to secrete
23. thirst
24. relating to a meal
25. stimulate

Quiz 11B Answer Key

1. homeostasis
2. luteinizing
3. Langerhans
4. circadian
5. thalamus
6. adrenocorticotropin
7. testosterone
8. triiodothyronine
9. exophthalmos
10. gynecomastia
11. hirsutism
12. pheochromocytoma
13. ketoacidosis
14. insulinoma
15. Recklinghausen
16. panhypopituitarism
17. cretinism
18. thyrotoxicosis
19. radioimmunoassay
20. adrenalectomy

Quiz 11C Answer Key

1. pineal gland
2. thyroid and parathyroid glands
3. adrenal glands
4. pancreas
5. pituitary gland
6. thymus gland
7. ovary
8. testis

Quiz 11D Answer Key

1. pituitary gland
2. bone and soft tissue
3. GH
4. testes
5. FSH, LH
6. ovary
7. FSH, LH
8. thyroid gland
9. TSH
10. adrenal cortex
11. ACTH
12. breast
13. PRL

Quiz 11E Answer Key

1. thymitis
2. parathyroidal
3. pancreatic
4. thymic
5. thyroidal
6. thyroidectomy
7. hypopituitarism
8. hyponatremia
9. hyperkalemia
10. endocrinologist
11. hypercalcemia
12. hypoglycemia
13. adrenopathy
14. acromegaly
15. polyuria

Quiz 11F Answer Key

1. adrenocorticotropin hormone
2. antidiuretic hormone
3. basal metabolic rate
4. diabetes insipidus
5. diabetes mellitus
6. fasting blood sugar
7. follicle-stimulating hormone
8. growth hormone
9. glucose tolerance test
10. insulin-dependent diabetes mellitus
11. potassium
12. sodium
13. alpha
14. protein-bound iodine
15. prolactin
16. parathyroid hormone
17. radioimmunoassay
18. triiodothyronine
19. thyroxine
20. thyroid function test
21. thyroid-stimulating hormone
22. non-insulin-dependent diabetes mellitus
23. beta
24. luteinizing hormone
25. melanocyte-stimulating hormone

Quiz 11G Answer Key

Multiple Choice

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

Matching

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

Abbreviations

1. insulin-dependent diabetes mellitus
2. protein-bound iodine
3. fasting blood sugar
4. sodium
5. thyroxine