

## Chapter 16 The Male Reproductive System

### OVERVIEW

The purpose of this chapter is to teach the anatomy and physiology of the male reproductive system and to present select concepts associated with pathophysiology or disease issues of the male reproductive system. The reproductive system has been divided into two chapters: male and female because this system works to define sexual characteristics even if reproduction does not take place. The functions of the reproductive system concerning male sexual characteristics are covered in this chapter. The functions of the reproductive systems concerning producing offspring are continued in Chapter 17 with pregnancy. The Putting the Pieces Together feature combines the male and female reproductive systems and is shown in both chapters.

Reproductive anatomy, hormonal regulation, and gamete production is more straight forward in the male, so the male reproductive system will be discussed first. Meiosis is explained in this chapter in Figure 16.12, which shows crossing over and independent assortment. From that discussion, spermatogenesis and spermiogenesis is explained.

Sexually transmitted diseases are not covered in this chapter, but a discussion point and group activity is described to first ascertain the students' knowledge of sexually transmitted diseases and then to research what the students do not know concerning this topic.

Chapter figures can be found in the Online Learning Center (OLC). Discussion points, group activities, and quizzes listed in the summary table below are explained under their individual outcomes following the table. Answer keys to the text chapter review questions, workbook concept maps, and workbook review questions are located at the end of the chapter.

A review guide is also available on the OLC. This guide lists all of the learning outcomes for the chapter and gives space for students to take notes and make sketches. This can be an important tool to encourage students to pay attention to what they are learning and to use to either take initial notes or to organize their existing notes before exams.

Learning Outcome	CAAHEP Competencies	ABHES Competencies
16.1 Use medical terminology related to the male reproductive system.	I.C.1. Describe structural organization of the human body	3.a. Define and use entire basic structure of medical words and be able to accurately identify in the correct context, i.e., root, prefix, suffix, combinations, spelling and definitions

16.2 Explain what is needed for male anatomy to develop.	I.C.5. Describe the normal function of each body system	2.b. Identify and apply the knowledge of all body systems, their structure and functions, and their common diseases, symptoms and etiologies.
16.3 Describe the anatomy of the testes.	I.C.4. List major organs in each body system	2.b. Identify and apply the knowledge of all body systems, their structure and functions, and their common diseases, symptoms and etiologies.
16.4 Describe the male secondary sex organs and structures and their respective functions.	I.C.5. Describe the normal function of each body system	2.b. Identify and apply the knowledge of all body systems, their structure and functions, and their common diseases, symptoms and etiologies.
16.5 Describe the anatomy of a sperm.	I.C.4. List major organs in each body system	2.b. Identify and apply the knowledge of all body systems, their structure and functions, and their common diseases, symptoms and etiologies.
16.6 Explain the hormonal control of puberty and the resulting changes in the male.	I.C.5. Describe the normal function of each body system	2.b. Identify and apply the knowledge of all body systems, their structure and functions, and their common diseases, symptoms and etiologies.
16.7 Explain the stages of meiosis and contrast meiosis to mitosis.	I.C.5. Describe the normal function of each body system	2.b. Identify and apply the knowledge of all body systems, their structure and functions, and their common diseases, symptoms and etiologies.
16.8 Explain the processes of sperm production and differentiate between spermatogenesis and spermiogenesis.	I.C.5. Describe the normal function of each body system	2.b. Identify and apply the knowledge of all body systems, their structure and functions, and their common diseases, symptoms and etiologies.
16.9 Explain the hormonal control of the adult male reproductive system.	I.C.5. Describe the normal function of each body system	2.b. Identify and apply the knowledge of all body systems, their structure and functions, and their common diseases, symptoms and etiologies.
16.10 Trace the path a sperm takes from its formation to its ejaculation.	I.C.4. List major organs in each body system	2.b. Identify and apply the knowledge of all body systems, their structure and functions, and their common diseases, symptoms and etiologies.
16.11 Describe the stages of the male sexual response.	I.C.5. Describe the normal function of each body system	2.b. Identify and apply the knowledge of all body systems, their structure and functions, and their common diseases, symptoms and etiologies.
16.12 Explain the effects of aging on the male reproductive system.	I.C.10. Compare body structure and function of the human body across the life span	2.b. Identify and apply the knowledge of all body systems, their structure and functions, and their common diseases, symptoms and etiologies.
16.13 Describe common diagnostic tests used for male reproductive system disorders.	I.C.6. Identify common pathology related to each body system	2.b. Identify and apply the knowledge of all body systems, their structure and functions, and their common diseases, symptoms and etiologies.

16.14 Describe male reproductive system disorders and relate abnormal function to pathology.	I.C.6. Identify common pathology related to each body system	2.b. Identify and apply the knowledge of all body systems, their structure and functions, and their common diseases, symptoms and etiologies.
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**SUMMARY TABLE 16**

LEARNING OUTCOME	LECTURE OUTLINE	ACTIVITIES – TALKING POINTS	ASSESSMENTS
16.1 Use medical terminology related to the male reproductive system.			<b>WkBk Chapter Review Questions:</b> <ul style="list-style-type: none"> <li>Word Deconstruction:1-5</li> </ul>
16.2 Explain what is needed for male anatomy to develop.	I. Overview  <b>Chapter Figures:</b> 16.2 (Chromosomal sex determination) 16.3 (Androgen-insensitivity syndrome)		<b>WkBk Chapter Review Questions:</b> <ul style="list-style-type: none"> <li>MS: 8</li> <li>Completion:1</li> </ul>
16.3 Describe the anatomy of the testes.	II. Male reproductive anatomy A. Testes  <b>Chapter Figures:</b> 16.4 (Descent of the testes) 16.5 (The testes and associated structures)	<b>WkBk Coloring Book:</b> <ul style="list-style-type: none"> <li>Testis and spermatic cord</li> </ul> Figure 16.2 (Anatomy of a testis and spermatic cord)	<b>Spot Check:</b> 1, 2  <b>WkBk Chapter Review Questions:</b> <ul style="list-style-type: none"> <li>MS: 9</li> <li>Completion: 2-4</li> <li>Critical Thinking: 1</li> </ul>
16.4 Describe the male secondary sex organs and structures and their respective functions.	B. Secondary sex organs and structures 1. Scrotum 2. Spermatic cord 3. Spermatic ducts	<b>Discussion Point:</b> What anatomy lowers the temperature of the testes for sperm production?  <b>Talking Point:</b> Although sperm need	<b>Quiz:</b> 1 (Covers LOS 16.3, 16.4. See Individual Outcome 16.4.) Figure IMQ16.1

	<ul style="list-style-type: none"> <li>a. Efferent ductules</li> <li>b. Epididymis</li> <li>c. Ductus deferens</li> <li>d. Ejaculatory duct</li> </ul> <p>4. Accessory glands</p> <ul style="list-style-type: none"> <li>a. Seminal vesicles</li> <li>b. Prostate gland</li> <li>c. Bulbourethral glands</li> </ul> <p>5. Penis</p> <p><b>Chapter Figures:</b></p> <p>16.6 (The male perineum)</p> <p>16.7 (The scrotum and spermatic cord)</p> <p>16.8 (The transfer of heat from the testicular artery to the pampiniform plexus)</p> <p>16.9 (The male reproductive system)</p> <p>16.10 (Anatomy of the penis)</p>	<p>to be developed at a cooler temperature, once developed sperm briefly travel through the warmer pelvic cavity of the male and then the female on the way to fertilize an egg.</p> <p><b>WkBk Coloring Book:</b></p> <ul style="list-style-type: none"> <li>• Male reproductive system</li> </ul> <p>Figure 16.1 (The male reproductive system)</p>	<p><b>Spot Check:</b> 3, 4, 8</p> <p><b>Chapter Review Questions:</b></p> <ul style="list-style-type: none"> <li>• MS: 3, 4</li> </ul> <p><b>WkBk Chapter Review Questions:</b></p> <ul style="list-style-type: none"> <li>• MS: 1, 2</li> <li>• Completion: 5</li> </ul>
16.5 Describe the anatomy of a sperm.	<p>C. Anatomy of a sperm</p> <p><b>Chapter Figure:</b></p> <p>16.11 (Mature spermatozoon)</p>	<p><b>WkBk Coloring Book:</b></p> <ul style="list-style-type: none"> <li>• Sperm</li> </ul> <p>Figure 16.3 (Anatomy of a spermatozoon)</p>	<p><b>Spot Check:</b> 5</p> <p><b>WkBk Chapter Review Questions:</b></p> <ul style="list-style-type: none"> <li>• MS: 10</li> </ul>
16.6 Explain the hormonal control of puberty and the resulting changes in the male.	<p>III. Physiology of the male reproductive system</p> <p>A. Hormonal control at puberty</p> <p>1. Male secondary sex</p>	<p><b>WkBk Concept Maps:</b></p> <ul style="list-style-type: none"> <li>• Hormonal control from development to puberty</li> </ul> <p>Figure 16.4 (Hormonal control from</p>	<p><b>Spot Check:</b> 6</p> <p><b>WkBk Chapter Review Questions:</b></p> <ul style="list-style-type: none"> <li>• MS: 3</li> </ul>

	characteristics <ul style="list-style-type: none"> <li>a. Muscular development</li> <li>b. Larynx changes</li> <li>c. Development of axillary and pubic hair</li> <li>d. Development of facial hair</li> <li>e. Aggression</li> <li>f. Development of the libido</li> </ul>	development to puberty concept map)	
16.7 Explain the stages of meiosis and contrast meiosis to mitosis.	B. Sperm production <ul style="list-style-type: none"> <li>1. Mitosis versus meiosis</li> </ul> <p><b>Chapter Figure:</b> 16.12 (Meiosis)</p>	<p><b>WkBk Concept Maps:</b></p> <ul style="list-style-type: none"> <li>• Meiosis</li> </ul> <p>Figure 16.5 (Meiosis concept map)</p> <p><b>Talking Point:</b> Stress the concept of the “reduction division” of the process of meiosis.</p>	<p><b>WkBk Chapter Review Questions:</b></p> <ul style="list-style-type: none"> <li>• MS: 4</li> </ul>
16.8 Explain the processes of sperm production and differentiate between spermatogenesis and spermiogenesis.	<ul style="list-style-type: none"> <li>2. Spermatogenesis</li> <li>3. Spermiogenesis</li> </ul> <p><b>Chapter Figures:</b> 16.13 (Sperm production) 16.14 (Spermiogenesis) 16.15 (Histology of a testis)</p>	<p><b>WkBk Lab Exercises and Activities:</b></p> <ul style="list-style-type: none"> <li>• Sperm production</li> </ul> <p>Table 16.1 (Sperm production)</p> <p><b>WkBk Concept Maps:</b></p> <ul style="list-style-type: none"> <li>• Sperm production</li> </ul> <p>Figure 16.6 (Sperm production concept map)</p>	<p><b>Quiz: 2</b> (Covers LOs 16.5 and 16.8. See Individual Outcome 16.8.) Figure IMQ16.2</p> <p><b>Spot Check: 7</b></p> <p><b>WkBk Chapter Review Questions:</b></p> <ul style="list-style-type: none"> <li>• Matching: 1-5</li> </ul>
16.9 Explain the hormonal control of the adult male reproductive system.	C. Hormonal control in the adult male	<p><b>Group Activity:</b> Anabolic steroids. (See Individual Outcome 16.9.)</p>	<p><b>Spot Check: 9</b></p> <p><b>WkBk Chapter Review Questions:</b></p>

	<b>Chapter Figure:</b> 16.16 (Hormonal control of the male reproductive system)	<b>WkBk Concept Maps:</b> <ul style="list-style-type: none"> <li>Hormonal control in the adult male</li> </ul> Figure 16.7 (Hormonal control in the adult male concept map)	<ul style="list-style-type: none"> <li>MS: 5</li> </ul>
16.10 Trace the path a sperm takes from its formation to its ejaculation.	D. Pathway for sperm	<b>Talking Point:</b> Sperm do not swim while in the male. Their movement through the male anatomy is through muscle action.  <b>Talking Point:</b> The best way to study the male reproductive structures is to follow a sperm cell from its origin to the point of ejaculation.	<b>Quiz:</b> 3 (Covers LOs 16.4 and 16.10. See Individual Outcome 16.10.)  <b>WkBk Chapter Review Questions:</b> <ul style="list-style-type: none"> <li>Critical Thinking: 3</li> </ul>
16.11 Describe the stages of the male sexual response.	E. Sexual response in the male <ol style="list-style-type: none"> <li>Arousal</li> <li>Emission</li> <li>Ejaculation</li> <li>Resolution</li> </ol> <b>Chapter Figure:</b> 16.17 (The male sexual response)	<b>WkBk Coloring Book:</b> <ul style="list-style-type: none"> <li>Male sexual response</li> </ul> <b>Table 16.2</b> (Stages of the male sexual response)	<b>Spot Check:</b> 10, 11  <b>WkBk Chapter Review Questions:</b> <ul style="list-style-type: none"> <li>MS: 6</li> </ul>
16.12 Explain the effects of aging on the male reproductive system.	IV. Effects of aging in the male reproductive system		<b>WkBk Chapter Review Questions:</b> <ul style="list-style-type: none"> <li>MS: 7</li> </ul>
16.13 Describe common diagnostic tests used for male reproductive system	V. Diagnostic tests for male reproductive system disorders		<b>WkBk Case Study:</b> 3

disorders.	<p><b>Chapter Figure:</b> 16.18 (Digital rectal exam for examination of the prostate)</p> <p><b>Table:</b> 16.1 (Common diagnostic tests for male reproductive system disorders)</p>		
16.14 Describe male reproductive system disorders and relate abnormal function to pathology.	<p>VI. Male reproductive system disorders</p> <ul style="list-style-type: none"> <li>A. Prostate cancer</li> <li>B. Testicular cancer</li> <li>C. Hypospadias</li> <li>D. Hydrocele</li> <li>E. Epididymitis</li> <li>F. Phimosis</li> <li>G. Sexually transmitted diseases               <ul style="list-style-type: none"> <li>1. Gonorrhea</li> <li>2. Chlamydia</li> <li>3. Syphilis</li> </ul> </li> </ul> <p><b>Figures:</b> 16.19 (Testicular cancer) 16.20 (Hydrocele) 16.21 (Phimosis) 16.22 (Syphilis)</p> <p><b>Table</b> 16.2 (Summary of diseases and disorders of the male reproductive</p>	<p><b>Discussion Point:</b> Sexually transmitted diseases. (See Individual Outcome 16.13.) This discussion leads to the group activity below.</p> <p><b>Group Activity:</b> Sexually transmitted diseases. (See Individual Outcome 16.13.)</p>	<p><b>WkBk Chapter Review Questions:</b></p> <ul style="list-style-type: none"> <li>• Matching: 6-10</li> </ul> <p><b>WkBk Case Study:</b> 1, 2, 4</p>

	system)		
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INDIVIDUAL OUTCOMES

OUTCOME 16.3

**Spot Check 1:** Why would cryptorchidism result in sterility?

*Answer: The testes are too warm in the abdominal cavity to produce viable sperm.*

**Spot Check 2:** What is likely the least number of seminiferous tubules per testis? What is likely the greatest number of seminiferous tubules per testis?

*Answer: The least number is based on 1 seminiferous tubule per 250 lobules = 250 seminiferous tubules. The greatest number is based on 4 seminiferous tubules per 300 lobules = 1200 seminiferous tubules.*



**OUTCOME 16.4**

**Spot Check 3:** What structures have an effect on the temperature of the testes?

*Answer: The dartos muscle, the cremaster muscles, and the pampiniform plexus that is in each spermatic cord.*

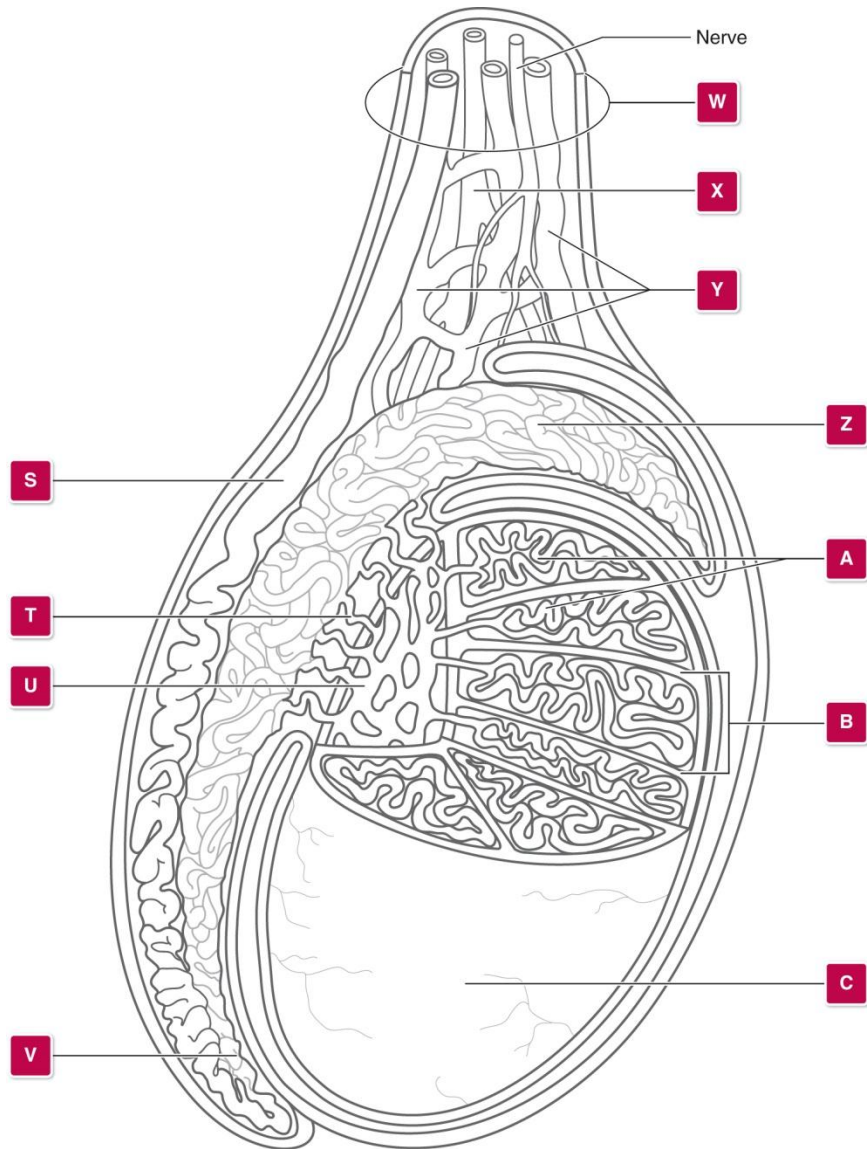
**Spot Check 4:** What is the composition of semen? Be specific.

*Answer: Semen is approximately: 10% sperm, 60% nourishing fluid from the seminal vesicles, 30% alkaline fluid from the prostate, and trace amounts of a lubricating fluid from the bulbourethral glands.*

**Spot Check 8:** What happens to the sustentacular fluid used to flush sperm out of the seminiferous tubules?

*Answer: It is reabsorbed in the epididymis.*

Quiz: 1



Use this figure to answer the following questions.

1. Identify W.
2. Identify V.
3. What is the function Y given that it branches as a network?
4. Identify U.
5. Identify T.
6. Identify A.
7. What happens in A.
8. Identify Z.
9. Identify S.
10. What muscle covers all of these structures?

*Spermatic cord*

*Pampiniform plexus*

*Cool the blood in the testicular artery as it flows to the testis.*

*Rete testis*

*Efferent ductule*

*Seminiferous tubules*

*Sperm production*

*Head of epididymis*

*Ductus deferens*

*Cremaster muscle*

## OUTCOME 16.5

**Spot Check 5:** Given the function of a sperm, explain the need for each part of its anatomy.

*Answer: The acrosome cap contains enzymes to penetrate the egg. The 23 chromosomes in the head are the genetic material to fertilize the egg. The large mitochondria are needed to make use of available oxygen to perform cellular respiration. This supplies the necessary ATP to move the tail that propels the sperm to where they have to go—the egg.*

## OUTCOME 16.6

**Spot Check 6:** What are the specific target cells for FSH and LH?

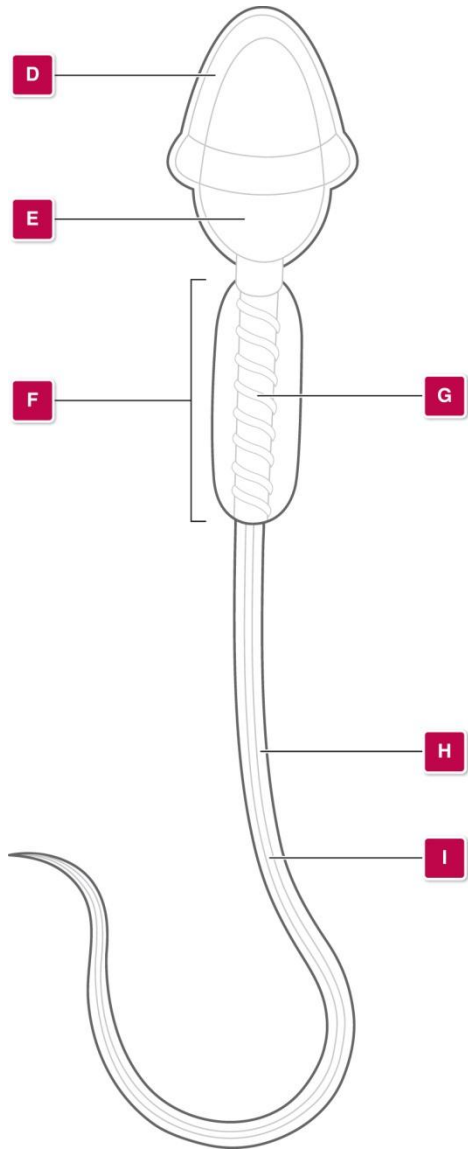
*Answer: FSH targets sustentacular cells and LH targets interstitial cells.*

**OUTCOME 16.8**

**Spot Check 7:** How do the chromosomes compare between the four spermatids?

*Answer: Each spermatid has a set of 23 chromosomes, but each set of 23 chromosomes differs from the other sets.*

Quiz: 2



## IM Ch 16

Use this figure to answer the following questions.

1. Identify E.
2. What does E contain?
3. Identify F.
4. Identify G.
5. What is the function of G?
6. Identify D.
7. What is the purpose of D?
8. Identify H.
9. Identify I.
10. Which process of sperm production produces this structure?

*Head*

*23 chromosomes*

*Midpiece*

*Mitochondria*

*Produce energy to move the tail*

*Acrosome cap*

*Protect the head from the acids of the vagina*

*Tail*

*Flagellum*

*Spermiogenesis*

### OUTCOME 16.9

**Spot Check 9:** What effect does inhibin have on testosterone production?

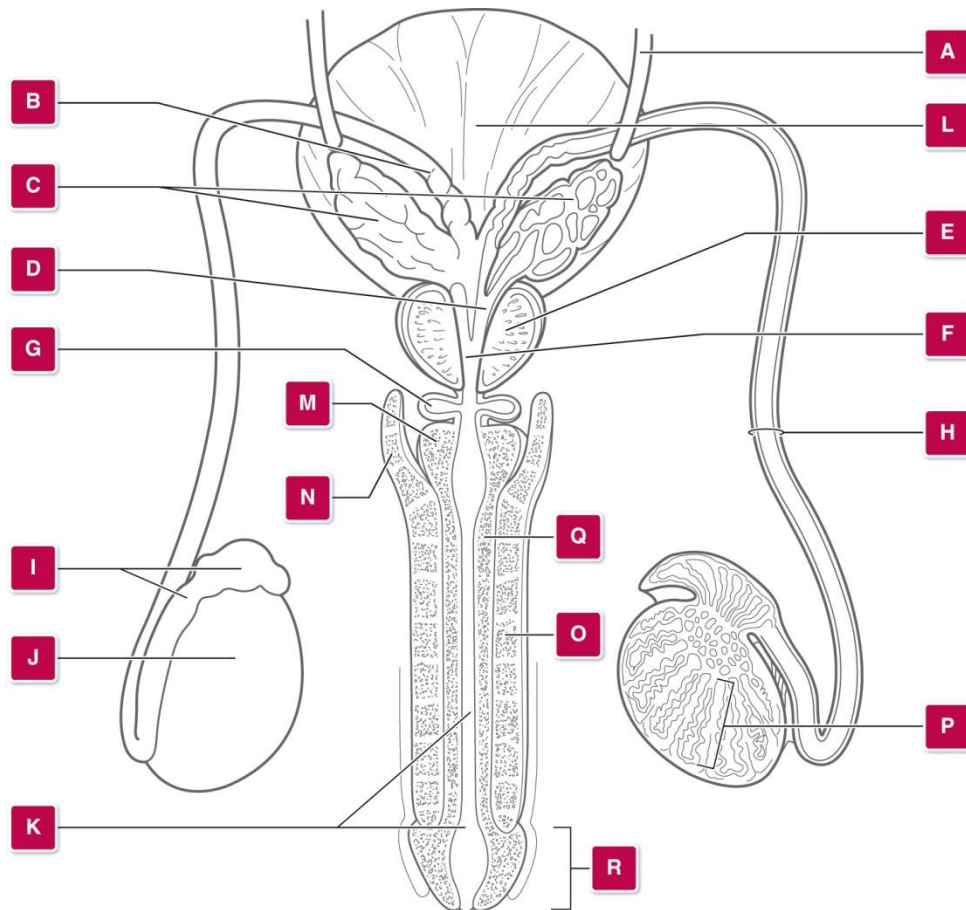
*Answer: None, because it has no effect on LH production.*

**Group Activity:** Anabolic steroids.

Critical Thinking: 1 question works well as a group activity to answer, followed by class discussion. It can be expanded to how anabolic steroids have affected professional sports.

OUTCOME 16.10

Quiz: 3



Use this figure to answer the following questions.

- |   |                                       |
|---|---------------------------------------|
| 1. Identify E.                              | <i>Prostate gland</i>                 |
| 2. What does E contribute to semen?         | <i>An alkaline fluid</i>              |
| 3. Identify G.                              | <i>Bulbourethral (Cowper's) gland</i> |
| 4. What does G contribute to semen?         | <i>Lubricating fluid</i>              |
| 5. Identify C.                              | <i>Seminal vesicles</i>               |
| 6. What does C contribute to semen?         | <i>Nourishing fluid</i>               |
| 7. Identify D.                              | <i>Ejaculatory duct</i>               |
| 8. Where do sperm go after D?               | <i>Urethra</i>                        |
| 9. Identify R. Be specific.                 | <i>Glans</i>                          |
| 10. Identify the erectile tissue labeled O. | <i>Corpus cavernosum.</i>             |

## OUTCOME 16.11

**Spot Check 10:** What might stimulate an erection?

*Answer: An erection may be stimulated as a reflex by stimulating the penis, or it may be initiated because of sound, smell, sight, or thought.*

**Spot Check 11:** What physically happens to cause a penis to become erect?

*Answer: The artery delivering blood to the penis dilates, the erectile tissues fill with blood, and the veins become compressed so that the excess blood cannot leave the penis.*



### OUTCOME 16.13

**Discussion Point:** Sexually transmitted diseases.

The students in the class are asked what they have already learned of sexually transmitted diseases. For example: What diseases are sexually transmitted?, What is their cause (bacterial, viral, fungal, other)?, How are they transmitted?, What is the transmission probability?, How do they affect the anatomy and physiology?, How are they treated?, What is the prognosis?, How can they be prevented? All of this information is put on the board to develop an outline for the following group activity to research the accuracy of and to fill in the missing knowledge of these diseases

**Group Activity:** Sexually transmitted diseases. The class is divided into groups to research sexually transmitted diseases. (See Discussion Point above.) Each group is responsible to research part of the sexually transmitted disease knowledge developed by the class through discussion.

**Case Study 3:** How can Aaron's condition be treated?

*Answer: Testosterone injections or surgery through the inguinal canal*

**OUTCOME 16.14**

**Case Study:**

1. What is this condition called?

*Answer: Cryptorchidism*

2. What diagnostic test (s) might physicians perform to diagnose Aaron's condition?

*Answer: Ultrasound*

3. What might happen if the condition is left untreated and the testicle remains outside of the scrotum? Explain.

*Answer: Sterility --- the temperature would be too warm for sperm development.*

*Increased risk of testicular cancer*

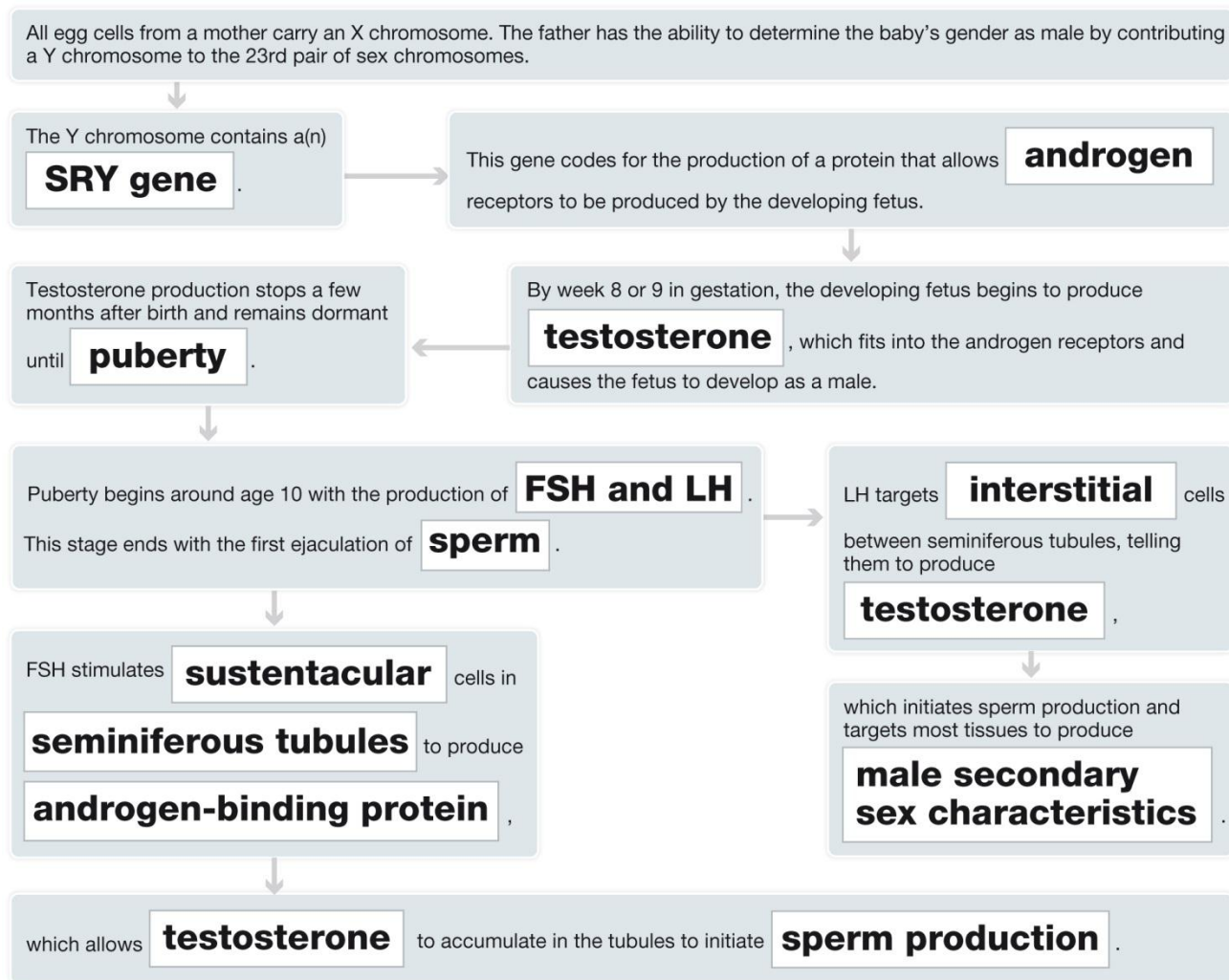
## ANSWER KEYS

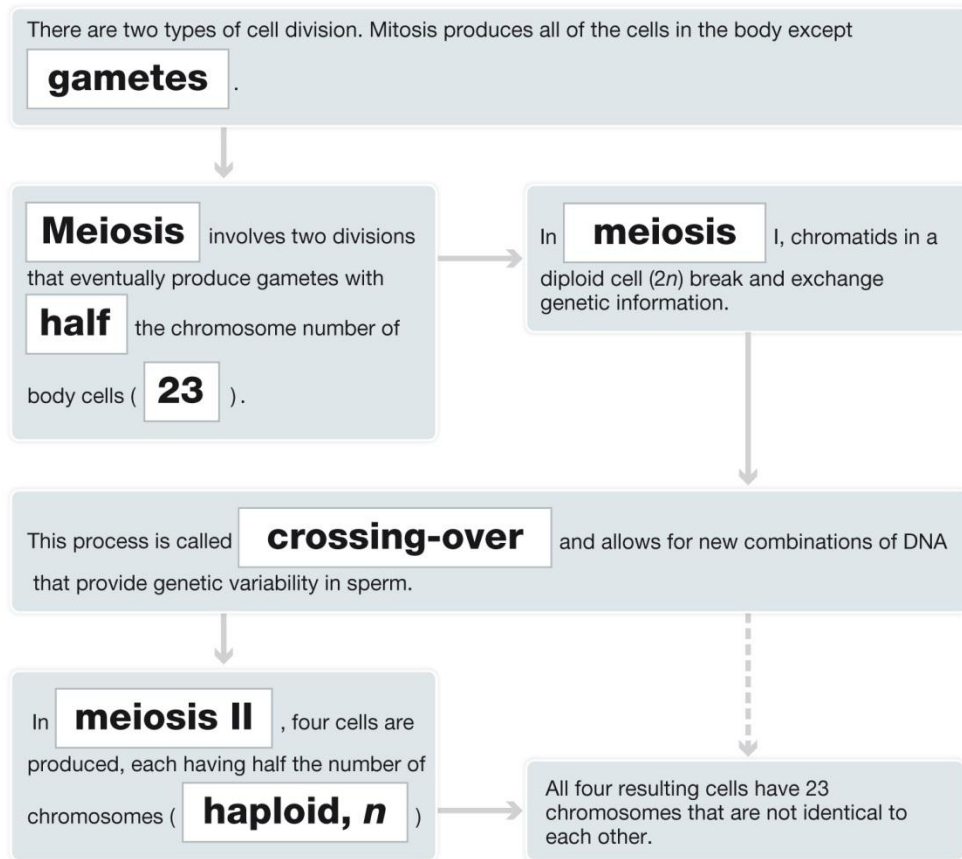
### Chapter Review Questions

1. C
2. C
3. C
4. C
5. D
6. A
7. B
8. B
9. C
10. C
11. D
12. D
13. D
14. A

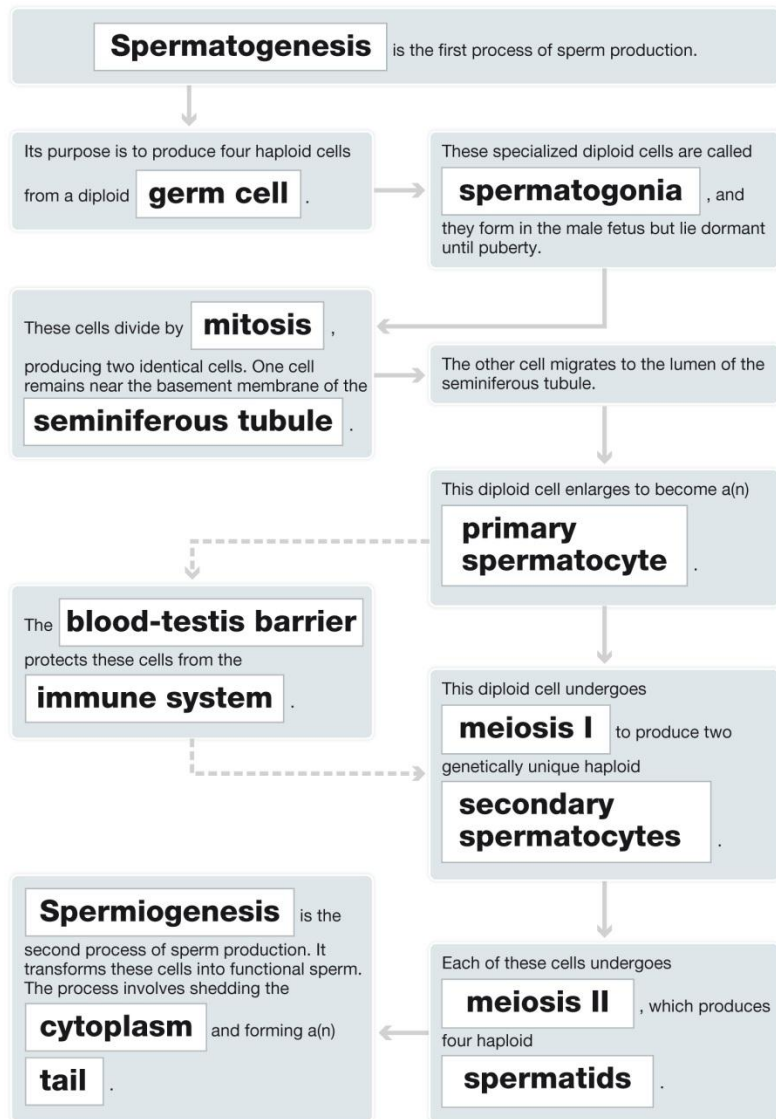
## WORKBOOK CONCEPT MAPS:

## Hormonal control from development to puberty

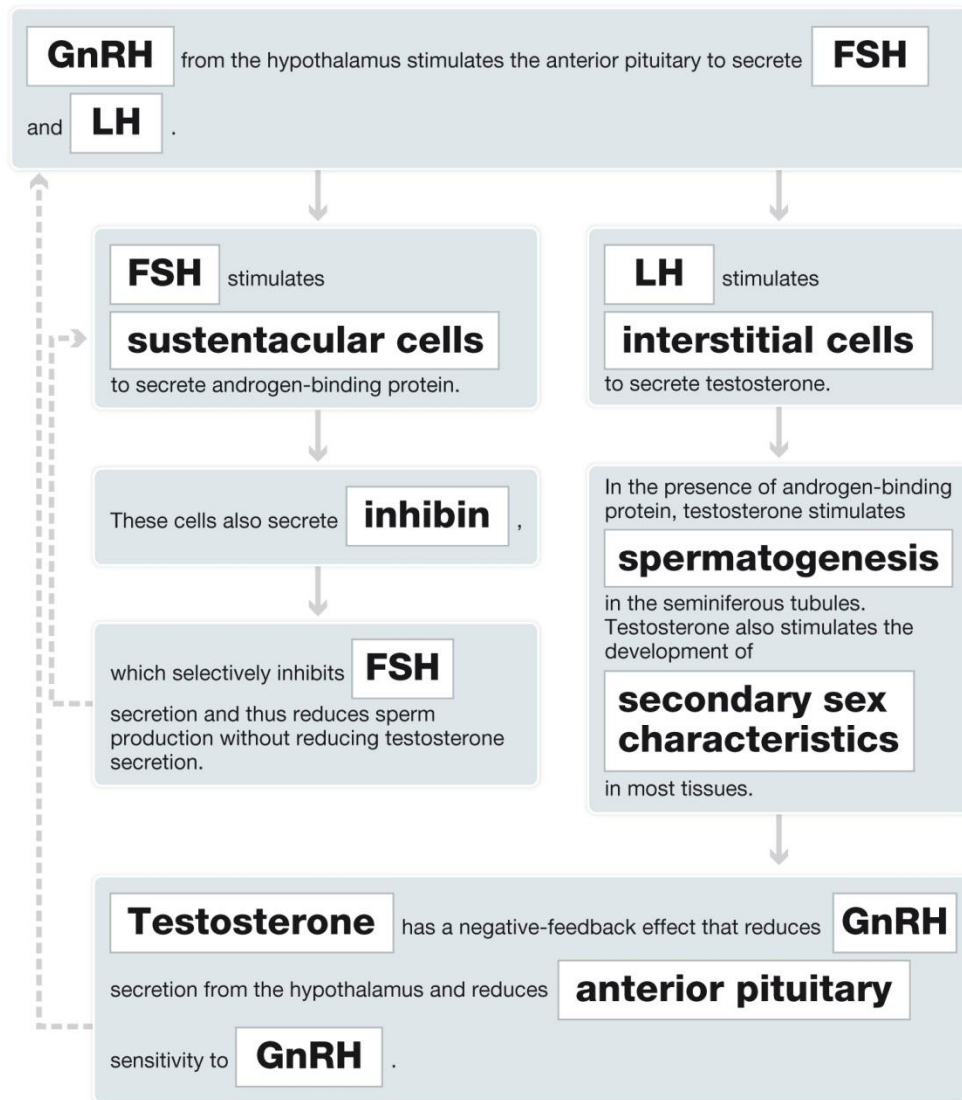


**Meiosis**

## Sperm production



## Hormonal control in the male



## Workbook Chapter Review Questions

### Word Deconstruction:

In the textbook, you built words to fit a definition using the combining forms and prefixes and suffixes. Here you are to break down the term into its parts (prefixes, roots, and suffixes) and give a definition. Prefixes and suffixes can be found inside the back cover of the textbook.

FOR EXAMPLE: Dermatitis: dermat/itis—inflammation of the skin

1. Cryptorchidism: *Crypt/orchid/ism, condition of hidden testicles*
2. Epididymitis: *Epididym/itis, inflammation of the epididymis*
3. Prostatectomy: *Prostat/ectomy, removal of the prostate*
4. Andropathy: *Andro/pathy, a male disease*
5. Penile: *Pen/ile, pertaining to the penis*

### Multiple Select:

Select the correct choices for each statement. The choices may be all correct, all incorrect, or any combination of correct and incorrect.

1. What is the anatomy of the spermatic cord?
  - a. The pampiniform plexus delivers blood to the testis.
  - b. Testicular arteries form a network of vessels around the ductus deferens.
  - c. *The ductus deferens travels through the inguinal canal.*
  - d. *The testicular artery travels through the inguinal canal.*
  - e. The dartos muscle in the spermatic cord contracts to draw the testes closer to the body.



2. What is the anatomy of the scrotum?

- a. The scrotum's cremaster muscle draws the testes closer together.
- b. A septum divides the scrotum into compartments—one for each testis.**
- c. The scrotum is in the peritoneum.
- d. The right testis is suspended in the scrotum lower than the left.
- e. The perineal raphe externally marks the location of the spermatic cord.

3. Juan is 10 years old. What can he expect to happen in the next few years?

- a. He will begin to produce testosterone again.**
- b. His voice will deepen due to an increase of testosterone.**
- c. He will begin to produce sperm.**
- d. His FSH and LH production will increase.**
- e. His GnRH production will decrease.

4. How do cells divide?

- a. All body cells divide by meiosis.
- b. Gametes are formed by mitosis.
- c. Body cells go through crossing-over before they divide.
- d. Meiosis results in four daughter cells.**

*e. Mitosis results in two daughter cells.*

5. Juan's brother, Jose, is 21 years old. How does Jose's endocrine system affect his reproductive system?

*a. His hypothalamus produces GnRH, so his posterior pituitary will produce FSH and LH.*

b. His testes produce testosterone to directly inhibit FSH production.

*c. His hypothalamus produces LH, so his testes will continue to produce testosterone throughout life.*

*d. FSH stimulates his sustentacular cells to produce androgen-binding protein so that testosterone has an effect on sperm production.*

e. His anterior pituitary produces FSH to stimulate interstitial cells to produce testosterone.

6. Which of the following is (are) accurate concerning the stages of the male sexual response?

*a. The stages are arousal, emission, ejaculation, and resolution.*

b. Bulbourethral muscles contract to expel sperm.

c. The internal urethral sphincter contracts during emission.

d. Trabecular muscles of erectile tissues relax during resolution.

e. The ductus deferens contracts in peristaltic waves during expulsion.

7. Herb is a 55-year-old farmer who gets frustrated because he does not seem to have the strength that he used to have. He also is not sleeping well because he needs to go to the bathroom several times a night. His wife reports that he is moodier than usual and is not as interested in having sex as he used to be. Although he is reluctant, Herb decides to tell all of this to his doctor at his annual check-up. Which of the following statements is (are) consistent with this description.

*a. The doctor will probably perform a digital rectal exam to check for BPH.*

*b. Herb may be experiencing andropause.*

*c. Herb's testosterone levels have fallen due to aging.*

*d. Herb's FSH and LH levels are likely elevated.*

*e. Herb's testosterone level may affect his libido.*

8. What must happen for male reproductive anatomy to develop?

*a. The zygote must have an X and a Y chromosome.*

*b. Testosterone must be produced by the developing gonads in the fetus.*

c. The X chromosome must have an SRY gene.

d. Testosterone must be produced in childhood.

e. Both sex chromosomes must have an SRY gene.

9. What is the anatomy of the testes?

- a. Each testis is composed of 4 lobules that contain 250 to 300 seminiferous tubules.
- b. Each testis has sustentacular cells between seminiferous tubules.
- c. Interstitial cells have receptors for inhibin.
- d. Sustentacular cells have receptors for LH.
- e. Sustentacular cells produce inhibin to inhibit production of FSH.*

10. What is the anatomy of a spermatozoon?

- a. The midpiece contains ribosomes.
- b. The acrosome cap contains a lubricant.
- c. The head contains mitochondria for energy production.
- d. The tail has cilia for movement
- e. There are 23 chromosomes in the acrosome cap.

**Matching:**

Match the cell to the correct number of chromosomes. The choices may be used more than once.

- |   |                   |
|---|-------------------|
| <u>  <b>b</b>  </u> 1. Spermatid              | a. 46 chromosomes |
| <u>  <b>a</b>  </u> 2. Type B spermatogonia   | b. 23 chromosomes |
| <u>  <b>a</b>  </u> 3. Primary spermatocyte   |                   |
| <u>  <b>b</b>  </u> 4. Secondary spermatocyte |                   |
| <u>  <b>b</b>  </u> 5. Spermatozoon           |                   |

**Matching:**

Match the male reproductive disorder to its description. Some of the choices may be used more than once.

- |   |                         |
|---|-------------------------|
| <u>  <b>c</b>  </u> 6. May be detected by a PSA blood test      | a. Hypospadias          |
| <u>  <b>b</b>  </u> 7. May be detected by a self-exam           | b. Testicular cancer    |
| <u>  <b>d</b>  </u> 8. May be detected by a digital rectal exam | c. Prostate cancer      |
| <u>  <b>a</b>  </u> 9. A congenital defect of the urethra       | d. BPH                  |
| <u>  <b>e</b>  </u> 10. Testes in the abdominal cavity          | e. Cryptorchidism       |
|   | f. Erectile dysfunction |

**Completion:**

Fill in the blanks to complete the following statements.

1. The SRY gene on the Y chromosome codes for a protein that interacts with other genes so that testosterone receptors are formed in a fetus.
2. The gubernaculum pulls the testes to their ultimate position in the scrotum.
3. Primary sex organs produce gametes (sex cells).
4. Each testis descends through an opening in the abdominal wall called the inguinal canal.
5. The accessory glands in the male reproductive system include two seminal vesicles, two bulbourethral glands, and one prostate gland.

**Critical Thinking**

1. James has a long commute each morning. He uses public transportation so that he can work on his laptop while on the road. He and his wife are trying to have a baby, but so far have been unsuccessful. Why might his laptop be the problem?

The laptop produces heat so that his testes are too warm to produce viable sperm.

2. What happens to the testes if a male does not regularly ejaculate sperm? Explain.

Nothing – any sperm produced that are not ejaculated are simply reabsorbed in the epididymis.

3. Marco's sperm fertilized his wife's egg a week after his vasectomy. How could this happen?

The sperm may have been past the site of the vasectomy and remained viable.

### **Case Study**

1. Cryptorchidism

2. Ultrasound

3. For the majority of infants with this condition, the testes descend sometime during the first year. However, if the testes do not descend within the infant's first year of life, the condition may be corrected by testosterone injections or surgery to guide the testes through the inguinal canal.

4. If not corrected, cryptorchidism can lead to sterility and increase the risk for testicular cancer.