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Male Reproductive System

I. Introduction to the Male Reproductive System

☞ *Concept:* The organs of the male and female reproductive systems are adapted to produce and allow the union of gametes that contain specific genes. A random combination of the genes during sexual reproduction results in the propagation of individuals with genetic differences.

A. Multiple Choice Questions

- ___ 1. Which of the following is *not* true regarding sexual reproduction?
- (a) It provides for genetic diversity through genetic recombination.
 - (b) It requires the production of two types of gametes.
 - (c) It requires two distinct body forms within the species.
 - (d) It is beneficial to a population.
 - (e) It eliminates changes in the gene pool.
- ___ 2. The primary sex organs
- (a) are those structures that are externally visible.
 - (b) produce the gametes and sex hormones.
 - (c) include the testes and penis.
 - (d) are sexual attractants.
- ___ 3. The secondary sex organs
- (a) are those organs that differ in males and females.
 - (b) produce the gametes and sex hormones.
 - (c) regulate meiosis.
 - (d) are essential in caring for and transporting gametes.
 - (e) are functional at birth.

B. True–False Questions

- ___ 1. The reproductive system is unique because of its latent development under hormonal control.
- ___ 2. The gonads of both the male and female are gamete-production sites.
- ___ 3. The accessory glands of the male reproductive system include the seminal vesicles, prostate, and the glans penis.

II. Perineum and Scrotum

☞ *Concept:* The perineum is the specific portion of the pelvic region that contains the external genitalia and the anal opening. The scrotum, a pouch that supports the testes, is divided into two internal compartments by a connective tissue septum.

A. Multiple Choice Questions

- _____ 1. Which of the following statements concerning the scrotum is *false*?
- (a) It is located within the perineum.
 - (b) It is partially subdivided into two compartments by a fibrous septum.
 - (c) Its external appearance varies with environmental conditions.
 - (d) It supports, protects, and regulates the position of the testes.
- _____ 2. Which of the following contract(s) in response to temperature changes?
- (a) perineal raphe
 - (b) dartos muscle
 - (c) median septum
 - (d) cremaster muscle
 - (e) both b and d
- _____ 3. The temperature of the testes is maintained at about
- (a) 35°C.
 - (b) 37°C.
 - (d) 40°C.
 - (e) 42°C.

B. True–False Questions

- _____ 1. The cremaster is a skeletal muscle that contracts both voluntarily and involuntarily.
- _____ 2. The scrotal raphe is the organ that contains the nerves, genital tube, and vessels that serve the testis.

III. Testes

☞ *Concept:* Located within the scrotum, the testes produce spermatozoa and androgens. Androgens regulate spermatogenesis and the development and functioning of the secondary sex organs.

A. Multiple Choice Questions

- _____ 1. Which of the following statements is *true* concerning the seminiferous tubules?
- (a) They nourish spermatids.
 - (b) They produce spermatozoa.
 - (c) They store mature sperm.
 - (d) They produce steroids.
 - (e) Both a and b are true.
- _____ 2. Which of the following statements is *true* concerning the interstitial cells (cells of Leydig)?
- (a) They nourish spermatids.
 - (b) They produce testosterone.
 - (c) They produce spermatozoa.
 - (d) They secrete alkaline fluid.
 - (e) Both b and d are true.
- _____ 3. Which of the following is the correct sequence regarding the production and passage of spermatozoa?
- (a) the interstitial cells, efferent ductules, ampulla, and epididymis
 - (b) the interstitial cells, rete testis, epididymis, and ampulla
 - (c) the seminiferous tubules, rete testis, efferent ductules, and epididymis
 - (d) the seminiferous tubules, ampulla, efferent ductules, and ductus deferens
- _____ 4. The structure of a spermatozoon includes all of the following *except*
- (a) an acrosome.
 - (b) mitochondria.
 - (c) a flagellum.
 - (d) a nucleus.
 - (e) cilia.
- _____ 5. The life expectancy of healthy spermatozoa ejaculated into the vagina is
- (a) 10 to 12 hours.
 - (b) 24 to 48 hours.
 - (c) 48 to 72 hours.
 - (d) up to 5 days.
 - (e) seemingly endless.

B. True–False Questions

- ___ 1. The tunica vaginalis and tunica albuginea are layers of the scrotum that encapsulate the testes.
- ___ 2. Sperm cells within the rete testis are undergoing maturation.
- ___ 3. The primary cause of male infertility is a varicocele of the testicular vein.
- ___ 4. The anabolic effects of androgens include protein synthesis, growth of bones, and erythropoiesis.
- ___ 5. Meiosis is the only type of cell division that occurs in the testes.
- ___ 6. One primary spermatocyte produces two spermatids.

IV. Spermatic Ducts, Accessory Reproductive Glands, and the Urethra

☞ *Concept:* The spermatic ducts store spermatozoa and transport them from the testes to the outside of the body by way of the urethra. The accessory reproductive glands provide additives to the spermatozoa to form semen, which is discharged from the erect penis during ejaculation.

A. Multiple Choice Questions

- ___ 1. All of the following are spermatic ducts *except*
 - (a) the epididymis.
 - (b) the urethra.
 - (c) the ductus deferens.
 - (d) the ejaculatory duct.
- ___ 2. Which of the following statements describes the ductus deferens?
 - (a) It extends from the testis to the prostate.
 - (b) It secretes glucose to keep the spermatozoa viable.
 - (c) It conveys spermatozoa from the epididymis to the ejaculatory duct.
 - (d) It is totally empty except during the brief periods of ejaculation.
 - (e) All of the above apply.
- ___ 3. Spermatozoa are stored prior to ejaculation in
 - (a) the epididymides.
 - (b) the seminal vesicles.
 - (c) the ductus deferentia.
 - (d) the ejaculatory ducts.
 - (e) both a and c.
- ___ 4. Which of the following is (are) *not* part of the spermatic cord?
 - (a) ductus deferens
 - (b) ampulla
 - (c) spermatic nerves
 - (d) spermatic vessels
 - (e) cremaster muscle
- ___ 5. The passageway by which the spermatic cord enters the pelvic cavity is called
 - (a) the testicular fossa.
 - (b) the femoral ring.
 - (c) the pelvic canal.
 - (d) the gubernaculum.
 - (e) the inguinal canal.
- ___ 6. Which of the following is the correct sequence of the paired-duct system for passage of spermatozoa during emission?
 - (a) the epididymides, ductus deferentia, and ejaculatory ducts
 - (b) the epididymides, ejaculatory ducts, and ductus deferentia
 - (c) the ductus deferentia, epididymides, and ejaculatory ducts
 - (d) the ductus deferentia, ejaculatory ducts, and epididymides

- _____ 7. An organ that is *not* an accessory gland of the male reproductive system is
 (a) the prostate. (c) the glans penis.
 (b) the seminal vesicle. (d) the bulbourethral gland.
- _____ 8. Semen is a mixture of fluids from
 (a) the seminal vesicles and the prostate.
 (b) the bulbourethral gland and the prostate.
 (c) the accessory glands and the glans penis.
 (d) the ejaculatory ducts and the seminal vesicles.
- _____ 9. Which of the following relationships between structure and location is *incorrect*?
 (a) The seminal vesicle is posterior to and at the base of the urinary bladder.
 (b) The ejaculatory duct is at the base (crus) of the penis.
 (c) The prostate is inferior to the urinary bladder and surrounds the beginning portion of the urethra.
 (d) The bulbourethral gland is inferior to the prostate.
- _____ 10. Which of the following is a function of the urethral glands?
 (a) secretion of mucus (d) regulation of spermatogenesis
 (b) secretion of fructose (e) regulation of the pH of semen
 (c) secretion of hormones

B. True–False Questions

- _____ 1. Approximately 2 months are required to produce mature sperm cells.
- _____ 2. The ductus deferens is a fibromuscular tube about 22 cm (9 in.) long that extends from the testis to the ejaculatory duct.
- _____ 3. The ejaculatory ducts store spermatozoa and additives to produce seminal fluid prior to ejaculation.
- _____ 4. Semen consists of spermatozoa from the testes and additives from the accessory glands.
- _____ 5. The discharge from the seminal vesicles makes up about 60% of the volume of semen.
- _____ 6. Not only does the prostate secrete additives in the production of semen, it also contains smooth muscles that contract to provide part of the propulsive force of an ejaculation.
- _____ 7. Bulbourethral glands secrete fluids that contain nutrients and prostaglandin.
- _____ 8. The membranous portion of the urethra is the longest portion.

V. Penis

☞ *Concept:* The penis, containing the spongy urethra and covered with loose-fitting skin, is specialized with three columns of erectile tissue to become engorged with blood for insertion into the vagina during coitus.

A. Multiple Choice Questions

- _____ 1. The bulb and crus of the penis are located within
 (a) the glans of the penis. (d) the prepuce.
 (b) the corona glandis. (e) the root of the penis.
 (c) the body of the penis.

- _____ 2. Which of the following statements concerning the penis is *false*?
- (a) It is attached proximally to the pubic arch.
 - (b) It consists of two columns of erectile tissue.
 - (c) Its skin is loosely attached and retractable over the glans penis.
 - (d) Its root contains the bulbospongiosus muscle.
 - (e) It is positioned in the urogenital triangle of the perineum.
- _____ 3. Which of the following relationships between structure and location is *incorrect*?
- (a) The prepuce is a retractable sheath of skin covering the glans penis.
 - (b) The external urinary ostium is located is at the tip of the glans penis.
 - (c) The median septum of the penis lies between the two columns of corpora spongiosum.
 - (d) The crus and bulb of the penis are located proximally within the root.

B. True–False Questions

- _____ 1. The glans penis is the cone-shaped terminal portion of the penis that is formed from the expanded corpus spongiosum.
- _____ 2. Smegma is a bacterial disease of the glans penis.
- _____ 3. Removal of the prepuce through circumcision permanently exposes the glans penis.

VI. Mechanisms of Erection, Emission, and Ejaculation

☞ *Concept:* Erection of the penis results from parasympathetic impulses that cause vasodilation of arteries within the penis and a decrease in venous drainage. Emission and ejaculation are stimulated by sympathetic impulses, which result in the forceful expulsion of semen from the penis.

A. Multiple Choice Questions

- _____ 1. Which of the following statements concerning erection of the penis is *true*?
- (a) It occurs only when a male is sexually aroused.
 - (b) It is under hormonal control.
 - (c) It is necessary for ejaculation to occur.
 - (d) It is a parasympathetic response.
 - (e) Both c and d are true.
- _____ 2. Erection is neurologically controlled by
- (a) the hypothalamus and sacral portion of the spinal cord.
 - (b) the cerebrum and hypothalamus.
 - (c) the genital sensory receptors and cerebrum.
 - (d) the vagus and sacral nerves.
- _____ 3. Which of the following statements regarding semen is *correct*?
- (a) It is entirely produced in the testes.
 - (b) It travels through the ductus deferentia during emission.
 - (c) It is discharged during ejaculation.
 - (d) It is also referred to as spermatozoa.
 - (e) All of the above are true.
- _____ 4. A normal ejaculate contains
- (a) 60–150 million spermatozoa per milliliter.
 - (b) 10 million spermatozoa per milliliter.
 - (c) 500 million spermatozoa per milliliter.
 - (d) 250–400 million spermatozoa per milliliter.

B. True–False Questions

- ___ 1. Sympathetic stimulation of the arteries within the penis causes engorgement of the erectile tissue as arteriole flow increases and venous drainage decreases.
- ___ 2. Fluid from the bulbourethral gland is usually discharged before penetration of the penis into the vagina and serves to lubricate the urethra and the glans penis.
- ___ 3. Ejaculation immediately follows emission and is accompanied by climax.
- ___ 4. Ejaculation is the expulsion of semen through the ductus deferentia and urethra of the erect penis.

VII. Developmental Exposition of the Reproductive System

A. Multiple Choice Questions

- ___ 1. The sexual identity of a fetus is determined at
 - (a) birth.
 - (b) 10 weeks.
 - (c) the second trimester.
 - (d) conception.
 - (e) 8 weeks.
- ___ 2. Male external genitalia develop in response to the presence of
 - (a) androgens.
 - (b) gametes.
 - (c) the phallus.
 - (d) seminal vesicles.
- ___ 3. The first sign of gonadal development is the appearance of
 - (a) the gonadal ridge.
 - (b) the primary sex cord.
 - (c) the Y chromosome.
 - (d) the genital tubercle.
 - (e) the gubernaculum.
- ___ 4. All of the following structures arise from the embryonic mesonephric duct *except*
 - (a) the epididymis.
 - (b) the ductus deferens.
 - (c) the seminal vesicle.
 - (d) the prostate.
- ___ 5. Sexual distinction of the external genitalia becomes apparent by the end of
 - (a) the embryonic period.
 - (b) the seventh week.
 - (c) the ninth week.
 - (d) the tenth week.
 - (e) the twelfth week.
- ___ 6. The scrotum forms from
 - (a) the primary sex cords.
 - (b) the genital tubercle.
 - (c) the gubernaculum.
 - (d) the labioscrotal swellings.
 - (e) the urogenital sinus.

B. True–False Questions

- ___ 1. Genetic sex determines whether the gonads will be testes or ovaries.
- ___ 2. The external genitalia of the male are completely formed at the end of the embryonic stage of development.
- ___ 3. Organs are considered to be homologous if they have similar functions.
- ___ 4. Both the glans penis of the male and the glans clitoris of the female develop embryonically from the phallus.
- ___ 5. The descent of the testes has generally been completed by the twenty-eighth week of development.
- ___ 6. It is thought that the function of the gubernaculum is to assist the descent of the testis into the scrotum.

VIII. Clinical Considerations

A. Multiple Choice Questions

- ___ 1. A person who has a 46 XY chromosome constitution and male gonads but intersexual and undifferentiated genitalia has the condition of
- (a) varicocele. (d) pseudohermaphroditism.
(b) cryptorchidism. (e) Turner's syndrome.
(c) orchid hyperplasia.
- ___ 2. A person with Klinefelter's syndrome has
- (a) the genotype XO. (d) an XXY chromosome constitution.
(b) 45 chromosomes. (e) none of the above.
(c) an extra Y chromosome.
- ___ 3. The incomplete descent of a testis is known as
- (a) impotence. (d) varicocele.
(b) oligospermia. (e) cryptorchidism.
(c) orchitis.
- ___ 4. In which of the following conditions would the person be able to produce viable spermatozoa?
- (a) true hermaphroditism (d) Turner's syndrome
(b) pseudohermaphroditism (e) Klinefelter's syndrome
(c) cryptorchidism
- ___ 5. Which of the following is *not* a cause of infertility?
- (a) vasectomy (d) impotence
(b) varicocele (e) excessive heat
(c) alcoholism
- ___ 6. Ligation (tying) of the ductus deferentia interferes directly with
- (a) ejaculation. (c) fertility.
(b) testosterone secretion. (d) erection capability.

B. True-False Questions

- ___ 1. People affected with Turner's syndrome have 47 chromosomes because of an extra X chromosome.
- ___ 2. Cryptorchidism should be treated at puberty to minimize trauma and prevent infertility.
- ___ 3. Infertility refers to the inability of a male to maintain an erection long enough to ejaculate.
- ___ 4. Infertility may be a temporary condition, but sterility is permanent.
- ___ 5. It is only during the primary stage that syphilis can be spread to a sexual partner.
- ___ 6. Prostatic carcinoma is the second leading cause of death from cancer in males in the United States.
- ___ 7. A hydrocele is an infection of the testes.

IX. Chapter Review

A. Completion Questions

1. _____ is the period of human development when the reproductive organs become functional.
2. The primary sex organs in a male are the _____ because they produce the gametes and sex hormones.
3. The structures attached to the testis that extend into the pelvic cavity constitute the _____.
4. Androgens are sometimes called _____ steroids because they stimulate the growth of muscles and other structures.
5. A fibromuscular cord called the _____ is thought to play an active role in the descent of a testis.
6. The growth of the testes during puberty is due to the combined effect of FSH, growth hormone, and _____.
7. The contraction or relaxation of the cremaster and _____ muscles determine the position of the testes within the scrotum.
8. An outer _____ forms a serous sac surrounding the testis, and an inner _____ is a fibrous membrane that directly encapsulates the testis.
9. The _____ cells produce and secrete male sex hormones.
10. _____ are diploid ($2n$) cells within the testes that give rise to haploid (n) gametes through the process of meiosis.
11. The tip of the head of a sperm, called the _____, contains digestive enzymes for penetration into the ovum.
12. Mature sperm are stored in the long, flattened _____, which is attached to the surface of the testis.
13. The _____ of the ductus deferens is the terminal portion that joins the ejaculatory duct.
14. Approximately 60% of the volume of semen is discharged from the _____.
15. The prostate secretes the enzyme _____, which is often measured clinically to assess prostate function.
16. The _____ is the prominent posterior ridge of the glans penis that is simulated during coitus by the vaginal rugae.

17. _____ is the movement of spermatozoa from the epididymides to the ejaculatory ducts.
18. During the _____ stage of reproductive development, the sex organs are apparent but cannot be distinguished as male or female.
19. During prenatal development, the _____ develops into the glans penis in the male and the _____ in the female.
20. In the condition of _____, the male ejaculates fewer than 10 million sperm cells per milliliter and is likely to be infertile.

B. Matching Questions

Match the structure with its function.

- | | |
|----------------------------|---|
| ___ 1. bulbourethral gland | (a) forms a protective sheath |
| ___ 2. prepuce | (b) secretes testosterone |
| ___ 3. seminiferous tubule | (c) provides a site for maturation of sperm |
| ___ 4. scrotum | (d) encloses the testes |
| ___ 5. prostate | (e) produces spermatozoa |
| ___ 6. rete testis | (f) assists the development of spermatids |
| ___ 7. crus | (g) stores spermatozoa |
| ___ 8. epididymis | (h) secretes additives into the semen |
| ___ 9. interstitial cells | (i) serves as an attachment for the penis |
| ___ 10. sustentacular cell | (j) secretes a lubricant |