Male Sexual Biology

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Why Learn About Male Sexual Anatomy and Physiology?

• Understanding one’s own and a partner’s sexual biology can foster healthy sexuality
  – Medical screenings (reduce anxiety)
  – Sexual stimulation and response
  – Birth control and contraception
  – Prevention of STIs
Male Sexual Biology

- Testes
- The Genital (Sperm) Duct System
- Fluid Producing Glands
- Ejaculation
- The Penis
- Androgenic Steroid Hormones
- Androgens and Behavior
- Review
Male Sexual Biology

• **Primary sex characteristics** – directly involved in the production and delivery of sperm or eggs, fertilization and pregnancy
  • **Testes** – sperm and sex hormones produced
  • **Genital duct system** – sperm transported from the testes to the outside
  • **Glands** – produce seminal fluid
  • **Penis** – external organ
Male Sexual Biology

- **Secondary sex characteristics** – anatomical and physiological features not primarily involved in the delivery of sperm or eggs or the maintenance of pregnancy, but are specific to members of a particular sex
  - Males are larger, stronger, have broader shoulders, slimmer hips and have prominent facial hair
  - Males tend to be aggressive, dominant and adept at spatial cognitive tasks
  - Generally the result of androgenic hormones
Male Reproductive System
(sagittal view)
External Structures

- Penis, Scrotum
The Testes

- Pair of oval-shaped organs
- Produce sperm & sex hormones
  - Testosterone
- Located in the scrotum, a sac-like structure that is attached to the front of the pelvis
- Suspended in the scrotum by the spermatic cord
  - Contains nerves, blood vessels, a sperm duct (vas deferens) and a thin muscle (cremaster)
  - Cremaster raises and lowers the testis in response to cold, fear, anger and sexual arousal.
The Testes

• Both testes develop inside a growing fetus, descend into the scrotum just before birth

• Temperature
  • In the scrotum the testes are 5 degrees cooler than normal body temp
  • Necessary for sperm viability
  • Prolonged exposure to heat decreases viable sperm production

• Coiled seminiferous tubules
  • 150 million sperm produced daily
The Genital (Sperm) Duct System

• Long Y-shaped tube divided into four parts through which sperm move from the testes to the outside of the body
  1. Epididymis
  2. Vas Deferens
  3. Ejaculatory Duct
  4. Urethra
The Genital (Sperm) Duct System

• **Epididymis**
  - Lies on the back of the testis
  - 6 meters of tubule densely coiled to ~ 4 cm
  - Damaged sperm are removed and remaining are concentrated into a dense mass and become capable of fertilizing an egg

• **Vas Deferens**
  - Moves sperm from the epididymis up to the pelvic cavity
  - Vasectomy involves blocking the movement of the sperm into the penis by surgically removing a portion of the vas deferens
The Genital (Sperm) Duct System

- **Ejaculatory Duct**
  - A short straight tube between the vas deferens and the urethra

- **Urethra**
  - Exit tube for the sperm and urine
  - A small band of smooth muscle surrounding the urethra near the bladder closes off the bladder blocking ejaculate from entering the bladder
    - Makes it difficult to urinate when the penis is erect
Three Fluid Producing Glands

- Sperm become mixed with secretions from three fluid-producing glands as they move through the genital duct system.
- Upon ejaculation the glands empty their contents into tubes that connect to the genital ducts.
  1. Seminal Vesicles
  2. Prostate Gland
  3. Cowper’s (Bulbourethral) glands
Fluid Producing Glands

• **Seminal Vesicles**  
  • Two vesicles located near the junction of each vas deferens and ejaculatory duct

• **Prostate Gland**  
  • Chestnut-sized organ surrounding the urethra near its origin at the bladder

• **Cowper’s (Bulbourethral) glands**  
  • Pair of pea-sized organs located along the urethra near the prostate
Fluid Producing Glands

- **Semen**
  - Mixture of seminal fluid and sperm
  - Seminal fluid is produced in the seminal vesicles and prostate
  - Made of water, fructose, vitamins, minerals and proteins
  - Fluid nurtures sperm, protects it from attack by the female immune system and neutralizes the acidity of the vagina
  - 95% seminal fluid, 5% sperm
Fluid Producing Glands

• **Cowper’s (Bulbourethral) glands**
  
  • Pair of pea-sized organs located along the urethra near the prostate
  
  • Produces small amounts of “pre-ejaculate”, a lubricating fluid that enters the urethra soon after a man becomes sexually aroused and before ejaculation
  
  • Contains few if any sperm
  
  • Can carry HIV
Ejaculation

- The release of semen from the penis
  - Nerve signals from the brain travel down the spinal chord to the smooth muscle tissue that surrounds the tubes of the genital ducts and the fluid producing glands

- **Emission Phase** - contraction of the smooth muscle forces seminal fluid into the genital duct system and propels semen to the prostate
  - Blocked temporarily by the prostatic urethra

- **Expulsion Phase** - semen collected my the prostatic urethra is forcefully propelled from the body by strong, rhythmic contractions of pelvic muscles and the smooth muscle surrounding urethra
  - “Wet Dreams” – spontaneous ejaculations during sleep
Spermatogenesis

- Ongoing process from puberty on
- Sperm produced within seminiferous tubules of testicles
- 150 million sperm produced daily
- 100 to 600 million sperm are contained in a single ejaculation!
Process of Spermatogenesis

- **Mitosis**
  - Spermatogonium
  - Type A cell

- **Meiosis I**
  - Type B cell
  - Primary spermatocyte (46 chromosomes)

- **Meiosis II**
  - Secondary spermatocytes (23 chromosomes)

- Spermatids (23 chromosomes)

- Spermatozoa
The Penis

- **Glans - Head**
- **Shaft** – has two primary internal compartments
  - *Corpora cavernosa* – two portions make the top of the penis
  - *Corpus spongiosum* – one portion lies underneath and contains urethra
The Penis

• **Erection**
  
  • Normally soft
  
  • Becomes hard when arteries that carry blood to the penis dilate, increases bloodflow in and decreases blood flow out.
  
  • Extra blood goes into the spongy tissues, especially the corpora cavernosa
  
  • Drugs promoting erectile capability act by slowing the rate by which the penile arteries return to their normal diameter
The Penis

- **Erection**
  - Caused by sexual excitement, touching of the penis, pressure from a full bladder or enlarged prostate, and during sleep
  - Involves the brain
  - Spinal Erection – caused by impulses from nerves in carious parts of the pelvis, can occur spontaneously without stimulus
The Penis

• **Foreskin**
  • Covers the end of the penis
  • **Circumcision** - parents often elect to remove the foreskin surgically
    • Protects against penile cancer, HIV/AIDS, and HPV transmission to female partners
    • AAP does not recommend routine neonatal circumcision
    • Can eliminate buildup of smegma which otherwise would buildup under the foreskin
    • Does not affect arousal or sexual experience
Androgenic Steroid Hormones

- **Hormone**
  - Chemical produced in one part of the body and brings about changes in another part of the body.
  - Bring about development of reproductive and sexual anatomy in fetal life and puberty, maintain and influence these structures in adulthood
  - Lock & Key Interaction of hormone with receptor
  - May trigger an immediate response or occur over several hours
Androgenic Steroid Hormones

- **Androgens**
  - Growing Fetus - Responsible for growth and development of the penis, genital ducts, fluid-producing glands and some parts of the brain
  - Puberty – growth development and functioning of those organs, and the formation of secondary sex characteristics
  - Adulthood – maintenance and function of male primary and secondary sex characteristics
  - Testosterone
Androgenic Steroid Hormones

• **Testosterone**
  
  • Main androgen
  
  • Produced in the testes and transported to testosterone-sensitive structures in the testes or through the bloodstream to other cells and organs
  
  • May be converted inside the cell to a different hormone bringing about biological changes
  
  • Manufacture and released is governed by the hypothalamo-pituitary-gonadal (HPG) system
Androgenic Steroid Hormones

- **HPG System**
  - **Hypothalamo** – nerve cells in the brain’s hypothalamus manufacture and secrete into the bloodstream GnRF (Gonadotrophin Releasing Factor)
  - **Pituitary** – gland located at the base of the brain, responds to GnRF by releasing LH (Leuteinizing Hormone) into the bloodstream
  - **Gonadal** – Testes respond to LH by manufacturing and releasing testosterone into the bloodstream
Androgenic Steroid Hormones

- **HPG System**
  - Controlled by the amount of testosterone in the bloodstream
  - More testosterone = slower GnRF production = slower LH production = slower testosterone production by the testes
Androgenic Steroid Hormones

- **Androgens**
  - Responsible for growth of genital and underarm hair, maintenance of interest in erotic experience and feelings of aggression
  - Contribute to acne and male pattern baldness
  - **Anabolic Steroids** – growth promoting androgens that are used illegally to increase muscle mass and bone density and allow an athlete to require less rest between workouts
Androgens and Behavior

- Sensation seeking and risky behavior
- Sexual Interest
- Competition
- Aggression and Dominance
- Cognitive Abilities
Androgens and Behavior

- Sensation seeking and risky behavior
  - Testosterone levels are related to the tendency to become bored easily and seek novel, complex and intense sensation
  - Increases the willingness to take risks
  - Increased risk of smoking cigarettes and using other drugs, reckless driving, and risky sexual behaviors
Androgens and Behavior

• **Sexual Interest**
  - At puberty there is a dramatic increase in testosterone levels that correlates with a large increase in interest in sex
  - Low levels in adults is associated with loss of interest in sex
  - Sexual interest can also stimulate androgen production
Androgens and Behavior

• **Competition**
  
  • Testosterone levels rise prior to and during sports competition in both male and female athletes
  
  • After competition testosterone levels remain high in victorious male competitors and return to normal in women and in losing male competitors
  
  • A similar pattern also exists in sports fans
Androgens and Behavior

- **Aggression and Dominance**
  - Aggression – physical, verbal, angry and hostile
  - In males aggression tends to be offensive (to dominate)
  - In females aggressing tends to be defensive (to protect)
Androgens and Behavior

- **Cognitive Abilities**
  - Related to mathematical reasoning and visual-spatial tasks
Androgens and Behavior

• How they affect behavior
  • Direct activation of brain cells
  • Alter brain structure

• Can produce traits which make certain males appear more dominant than others

• Rise in testosterone levels during competition may indicate that these traits were a necessary evolution of sexual dominance and reproduction
Sexuality in Review

1. Primary vs. Secondary sex characteristics
2. Testes produce androgenic sex steroid hormones
3. Process of ejaculation
4. Penile erection process and cause
5. Androgenic sex hormones bring about certain characteristically male biological and behavioral features
The End

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