

Science & Technology 4: The Penis, Testicles, and Surrounding Systems

Aim/Rationale

Students will understand the reproductive anatomy of bodies with penises.

Competencies

- 1) *Seeks answers or solutions to scientific or technological problems.*
- 2) *Makes the most of their knowledge of science and technology.*
- 3) *Communicates in the languages used in science and technology.*

Materials

- Projector and computer

Development/Teaching Methods

1. Presentation of Anatomical Diagrams: (15 minutes)

- Using the diagram, introduce basic reproductive anatomy of bodies with penises.
- Use the script below to explain the functions of the various organs and body parts.

ANATOMY:

Penis: for reproduction, sexual pleasure and secretion of both urine and semen. The tip (**glans**) is very sensitive and includes the **urethral opening** where semen and urine come out. The ridge that separates the glans and the tip is called the **corona**, and it is also very sensitive. The penis becomes erect when stimulated. An uncircumcised penis has an additional layer of skin (**foreskin**), which covers part of the glans.

Hygiene tip: Thoroughly clean underneath the foreskin of an uncircumcised penis to prevent unwanted residue/build-up.

Following the path of sperm:

- **Testicles (testis):** Site of sperm production and sex hormone production. Both are about the same size and covered by a sack of skin called the **scrotum**, but often one hangs lower than the other. They are located outside the body because sperm production requires a temperature of 2°C lower than internal body temperature.
- **Epididymis:** The duct on the testis that stores sperm.
- **Vas Deferens:** The tube that carries sperm from the epididymis to the urethra for ejaculation.
- **Seminal Vesicles and Prostate:** Secretes most of the fluid that forms **semen** when combined with sperm. Semen is comprised of sperm, nutrients, chemical buffers (which counteract the acidity of vaginal secretions).
- **Urethra:** Conducts both urine and semen to the outside (pre-ejaculate/pre-cum clears the urethra of lingering sperm or built up residue from urine before ejaculation occurs).

2. Reproductive hormones of bodies with penises: (10 minutes)

Background knowledge (may or may not be necessary to review):

- **Hormones:** Chemical messengers carried through the bloodstream
- **Endocrine glands:** Secretes hormones.
- The **endocrine system** consists of all of the endocrine glands, and is one of the body's main communication systems (the other is the nervous system).
- The **hypothalamus** is part of the brain and is an important component of the endocrine system.
- The **pituitary gland** is connected to the hypothalamus.
- The pituitary gland is comprised of two adjacent lobes: the **anterior pituitary** and the **posterior pituitary**, both serve different endocrine functions.
- **GnRH (Gonadotropin Releasing Hormone):**
 - Secreted from hypothalamus, acts on anterior pituitary
 - Signals release of LH and FSH from anterior pituitary
- **LH (Leutenizing Hormone):**
 - Secreted from anterior pituitary
 - Controls production of testosterone in testes
 - Which in turn facilitates spermatogenesis (sperm production)

- **FSH (Follicle Stimulating Hormone):**
 - Secreted from anterior pituitary
 - Controls gamete production

Testosterone (reproductive functions only, though there are others):

- Responsible for secondary sex characteristics (i.e. facial hair, Adam's apple)
- Facilitates spermatogenesis (sperm production)
- Required for sex drive

3. Erection and Ejaculation: (10 minutes)

(Use the diagram to point out locations of anatomical structures, for example, the sphincter at the base of the bladder.)

- As previously mentioned, sperm is stored in the **epididymis** and the **vas deferens**. In the epididymis, fluid is absorbed and the sperm becomes a concentrated, dense mass. Sperm moves at ejaculation by smooth muscle in the epididymis and vas deferens.
- **Erection:**
 - The penis consists of three compartments of spongy tissue. When flaccid, blood flow to the penis is constricted so the compartments contain little blood.
 - When sexually excited, the arteries dilate and blood flow increases to the penis at a high pressure causing the penis to become rigid or **erect**.
 - The central nervous system controls dilation of the arteries in response to thoughts, emotions, and senses such as sight and smell.
- **Ejaculation:**
 - A high level of penile stimulation gives rise to two phases of a spinal reflex:
 - 1. Emission: The semen (sperm + secretions) are emptied into the urethra by smooth muscle contractions of the epididymis and vas deferens. The ejaculatory ducts, prostate and seminal vesicles also contract.
 - 2. Semen Expulsion: Approximately 3mL of semen containing 300 million sperm is released by fast contractions of smooth muscle in the urethra and muscles at the base of the penis.
 - During ejaculation, the sphincter at the base of the bladder is closed so that no urine can pass through the urethra and no sperm can enter the bladder.
 - An **orgasm** is generally associated with ejaculation and the muscle contractions are associated with intense pleasure.

Assessment ideas

In groups, have students research one of the following health issues: Prostate cancer, testicular cancer, Viagra, testosterone injections, anabolic steroids, circumcision etc. Students should touch on the following in their presentations:

- What age range of men (typically) does this topic affect most?
- Discussion of the anatomy relating to the topic
- Diagnosis/Treatment
- How it works
- New or recent areas of research on the topic
- Population trends with respect to the topic



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