

PURPOSE

To reinforce the concept that the production of sperm and the hormone testosterone is a sign of health in men.

To introduce the female ovulatory cycle.

LEARNING OBJECTIVES

By the end of the lesson students will be able to:

1. Understand how sperm is produced and that this process is vital to men's overall health.
2. Understand the ovulatory cycle and that this process is vital to women's overall health.
3. Understand how a sperm and egg create the beginning of a new human life.

MATERIALS & RESOURCES

- **Lesson 4 teenMEN** powerpoint
- **Entry Ticket Activity: Decode your Hormones**
- **Worksheet: Male Hormones and Sperm + Answer Key**
- **Worksheet: Female Hormones and Ovulation + Answer Key**

VOCABULARY

- **Hormones:** Chemical signals that travel in the bloodstream, directing the activity of every system. The body has many different hormones, produced in different parts of the body.
- **Testosterone:** The main male hormone, produced in the testes.
- **Testicles (or testes):** Two small organs, located in the scrotum that produce **sperm**, the male cell of reproduction. The testes also produce the male hormone, testosterone.

- **Semen:** The fluid containing sperm; semen is transported and released from the body through the urethra.
- **Epididymis:** the duct/tube at the back of the testes which serves as the passageway of the sperm from the testes to the vas deferens. It has a significant function since it stores and matures sperm. Note that sperm directly from the testes are immature and are not yet ready to fertilize an egg.
- **Vas deferens:** A tube that transports sperm from the testicles to the urethra. There are two vas deferens, one for each testicle.
- **Female Reproductive System:** The group of organs in the lower belly/pelvis that work together to mature an egg (the female cell of reproduction) and to develop a growing baby.
 - **Egg:** The female cell of reproduction, stored in the ovaries.
 - **Follicle:** The tissue that surrounds an egg as it matures in the ovary.
 - **Ovulation:** When a mature egg is released from the ovary.
 - **Estrogen:** The hormone produced by the growing egg/follicle.
 - **Progesterone:** The hormone produced by the corpus luteum after ovulation.
 - **Zygote:** A fertilized egg; the beginning of a new human life.

PREPARATION

- ☐ Print the **Entry Ticket Activity: Decode your Hormones** to provide one ticket for each student.
- ☐ Print the **Male Hormones and Sperm Worksheet** for each student.
- ☐ Print the **Female Hormones and Ovulation Worksheet** for each student.

PROCEDURE

Step 1 (5 minutes): Entry Ticket Activity: Decode your Hormones

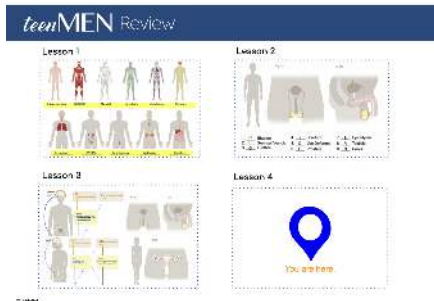
Decode the message



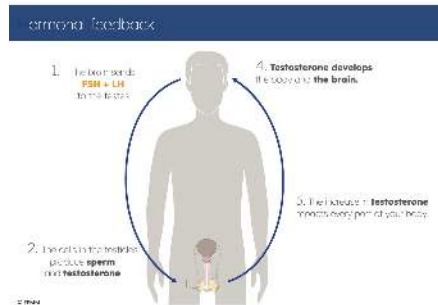
Hand out one ticket per student and see who can decode the cryptogram message first!

Answer: HORMONES ARE CONTROLLED BY THE BRAIN

Step 2 (5 minutes): Review



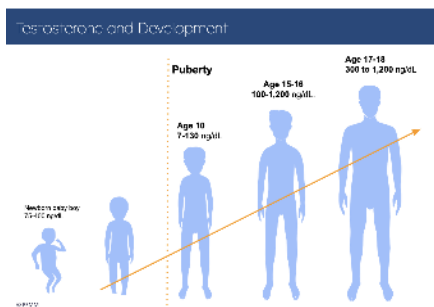
In the first lesson of teenMEN, we learned about all the 11 systems of the body and homeostasis. In the second lesson, we learned about the parts of the male reproductive system and how the brain and the reproductive system are linked through a hormonal axis. In lesson three we learned about the male and female reproductive anatomy and how hormones, controlled by the brain, are vital to the healthy function of both systems.



Hormonal feedback is another way of thinking about the communication between the brain and the reproductive system. In men, the brain communicates with the testes to produce testosterone and this in turn feeds back to the brain, like a loop. As we learned last lesson, the pituitary gland sends Follicle Stimulating Hormone and Luteinizing Hormone to the testes. The cells in the testes respond by producing sperm and testosterone. The increase in testosterone impacts every part of your body. An amazing thing is that the brain helps to generate testosterone, and this hormone in turn develops the different parts of your brain. This is **hormonal feedback**.

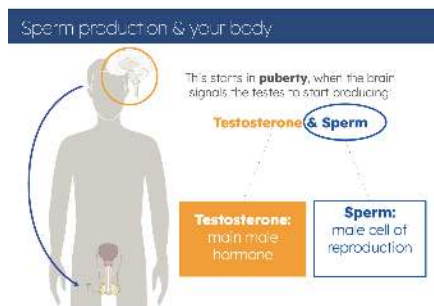
Step 2 (10 minutes): Testosterone & sperm development

When does **hormonal feedback** begin? At just nine weeks after conception, the male fetus in the womb is already beginning to secrete testosterone, developing the brain and male genitalia.

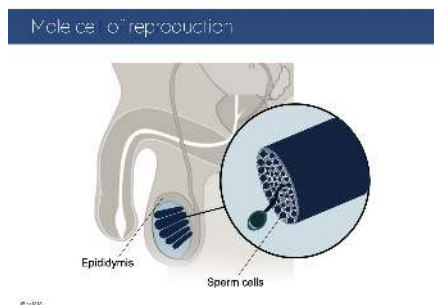


As a newborn baby, there is a second surge of testosterone, accelerating growth and impacting brain development around 1-3 months. Testosterone levels then drop again, until around age 10. During puberty, the male body produces about 30 times more

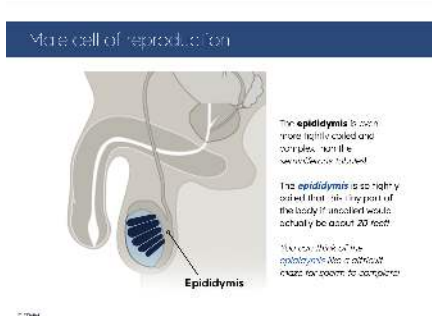
testosterone than it did before puberty. This slide shows the normal range of testosterone measured in the blood. The numbers are measured in ng/dL which stands for nanograms per deciliter, but you don't have to know that. The main thing is just to show that there is a mini-testosterone surge after birth and then a major surge during puberty, between the ages of 10-17. This surge in testosterone at the onset of puberty causes the cells in your testes to mature and begin the production of sperm.



From before you were born, your body produced testosterone and had the capacity to produce sperm. But during puberty, thanks to testosterone and other hormones, the body **activates** the sperm-producing cells in the testicles.

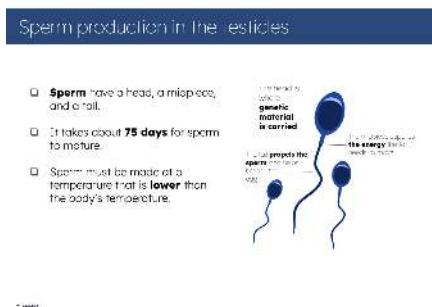


Sperm develop within a system of tiny tubes in the testes called the **seminiferous tubules**. Sperm cells divide and grow in these tubes until they have a head, midpiece and short tail.



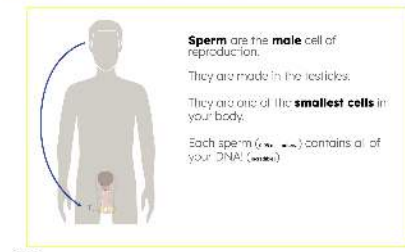
From there, sperm move into the **epididymis**. The epididymis is even more tightly coiled than the seminiferous tubules in the testes. The epididymis is a highly complex tissue. If uncoiled, the tiny epididymis would measure about *20 feet!* The **epididymis** is like a difficult maze for sperm to go through, ensuring that sperm properly mature and that only the healthiest survive the journey.

From the epididymis, sperm travels up the **vas deferens**, joins with fluid from the seminal vesicle, passes through the prostate and empties into the urethra. This fluid is called **semen**. Semen is propelled out of the urethra in a process called ejaculation. When sperm isn't ejaculated, the sperm cells simply break down in the epididymis. This is a normal part of the male reproductive cycle.



Under a microscope you can see that sperm have a few distinct parts. Sperm have a head, a midpiece, and a tail. Each part of the sperm serves a special function in human reproduction, to enter the female egg and join together to create a new life. It takes about 75 days for your body to mature new sperm, but as of puberty, this process is happening every day in your body, so sperm is constantly being generated. Sperm must be made at a temperature that is lower than the body's temperature. This is why the testicles are located outside the body to maintain a separate temperature.

Sperm production in the testes



Sperm is the male cell of reproduction. The sperm cell is approximately **0.05 millimeters long**, which is very tiny. In contrast to the egg cell, the female cell of reproduction, the male sperm cell is one of the smallest cells of the human body! The egg cell is roughly ten times bigger than sperm. Each sperm (0.05 millimeters long) contains all of your DNA. Isn't that incredible?!

Hand out the **Worksheet: Male Hormones & Sperm** for students to complete.

How much do you **really** know about...



When students are finished, review the answers and explanations on the slide and in the slide notes. Or, use the Answer Key provided in the materials.

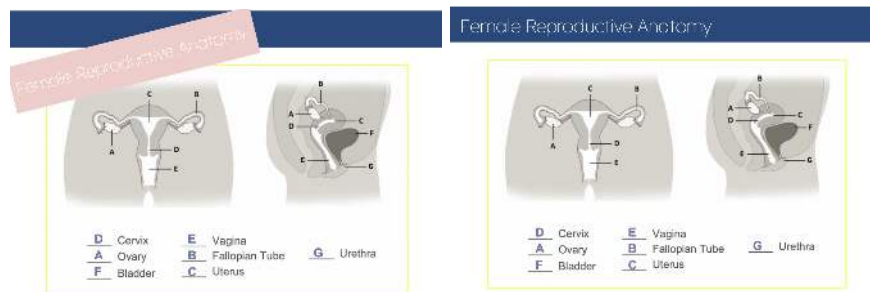
Answers | How did you do?



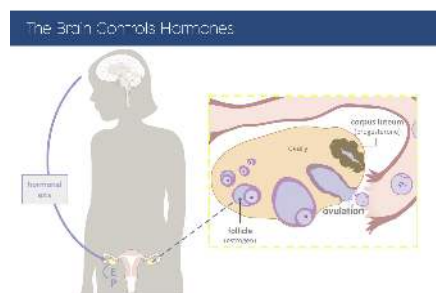
Step 3 (10 minutes): Female Anatomy & Ovulation Cycle

Now that we've tested your knowledge and dispelled a few myths regarding the male reproductive system, let's see if you can remember the female anatomy.

Use Female Reproductive Anatomy slide and label together as a class, having students provide the answers aloud. Click on the slide to reveal one answer at a time.

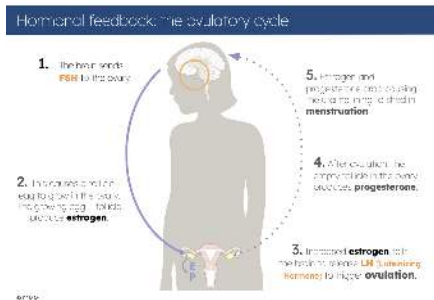


Women's bodies also use hormones to produce the female cell of reproduction, the egg.



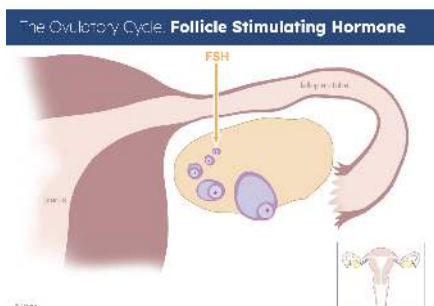
At the onset of puberty for girls, the brain signals the **ovary** to develop an egg each month. The main female hormones are **estrogen** and **progesterone**, represented on the slide as E and P.

You may have generally heard a female cycle referred to as the “menstrual cycle” or a “period”. But it's actually more correct to call it the **ovulatory cycle**, as ovulation is the main event of the cycle each month. The human body is complex. **Understanding the intricacy of each person's reproductive system gives us greater respect for one another.** Let's look at the fascinating hormonal feedback in the female ovulatory cycle.

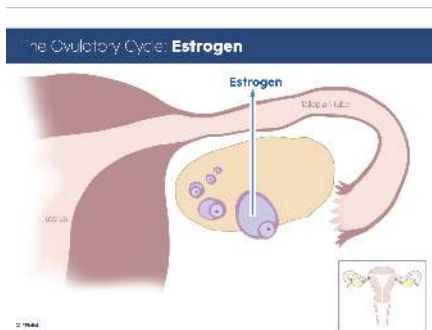


1. The brain sends the hormone, FSH (Follicle Stimulating Hormone), to one of the ovaries each month, to kickstart the growth and development of an egg and follicle inside the ovary. The egg is surrounded by a special, protective tissue, called a follicle. (Hence, the name: *follicle stimulating hormone*.)
2. FSH causes an egg and follicle to grow. The growing egg and follicle in the ovary produce estrogen.
3. The increased levels of estrogen in the body produced by the egg and follicle, feeds back to the brain to release the hormone LH (Luteinizing Hormone). LH triggers ovulation and the egg is released from the ovary.
4. The empty follicle in the ovary produces the hormone progesterone.
5. Estrogen and progesterone levels drop, causing the lining of the uterus to shed in menstruation, in preparation for the next cycle.

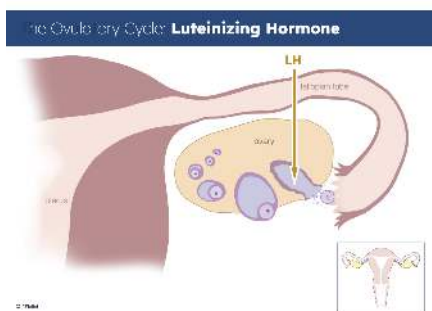
This is a lot of new information, so let's look at this process in the ovary, step by step.



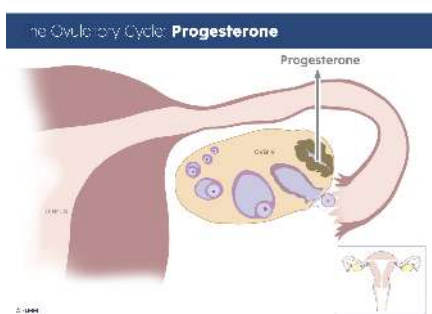
The brain sends FSH to the ovary to stimulate the egg and follicle to grow. As the egg and follicle grow together, (you can see it on the slide) they increase in size.



As the egg and follicle continue to increase in size, day to day, they produce more and more estrogen. When the egg and follicle are fully developed, estrogen reaches its peak and **feeds back to the brain** to send *Luteinizing Hormone* (LH).



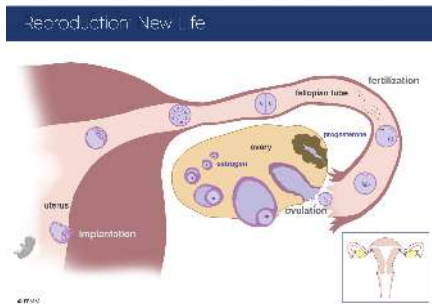
LH is sent from the brain to the ovary and causes the egg to be released from the follicle into the fallopian tube. This is called **ovulation**.



After ovulation, the egg's empty follicle stays in the ovary and the body does an amazing thing: it "recycles" the follicle. The body changes the follicle so that it becomes a new tissue called the *corpus luteum*, which makes the hormone **progesterone**.

But what happens to the egg after it is released from the ovary into the fallopian tube?
In a typical cycle for adolescents, if there is no sexual contact and no sperm present, the

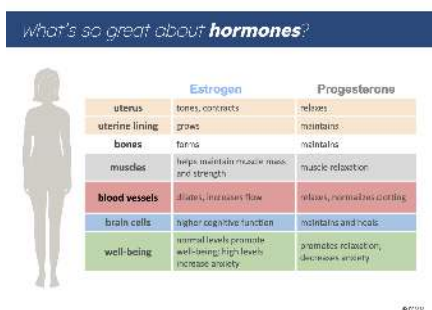
egg simply dissolves in about 12-24 hours. And eventually, the uterus lining, which has been thickening during the process of the cycle, sheds in menstruation. Menstruation or “a period” is the end of one ovulatory cycle.



In the case of reproduction, through intercourse, the sperm present in ejaculatory fluid travel from the vagina up to the uterus and join with the egg in the fallopian tube to fertilize the egg.

A fertilized egg is also known as a **zygote**: the beginning of a new human life. This newly formed life contains the genetic material of both parents. The zygote travels into the uterus, where it embeds into the uterus wall; there it continues to grow with the expanding uterus until a baby is born approximately nine months later.

Did you know? Just as sperm production is a sign of hormonal health in men, the process of ovulation is important for hormonal health in women. Ovulation isn’t just relevant when you want to become a parent; without ovulation, the female body doesn’t make all of the female hormones that a woman’s body needs to be healthy.



Here are some of the amazing things these two hormones do together, to support women’s health. For example, estrogen increases cognitive function in women.

Progesterone heals the brain and helps with sleep! Estrogen builds women's bone mass. Progesterone strengthens women's bones.



Men's bodies also produce progesterone and estrogen - just in very small amounts. And women's bodies also produce small amounts of testosterone. Look at how vital testosterone is to the healthy function of every part of your body! From your bones to your blood and well-being, hormones are at work!

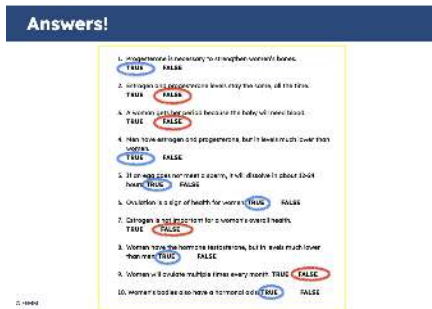
Step 4 (5 minutes): Worksheet: Female Hormones & Ovulation

Hand out the **Female Hormones + Ovulation Quiz** for students to complete.



When students are finished, review the answers together using the next slide or with the

Answer Key provided in the materials.



CONCLUSION

Today we learned more about the male and female cells of reproduction and how their production is intricately linked with hormones and the brain! Your brain is in charge of directing all of this hormonal activity in puberty! In the next lesson, we're going to learn more about supporting our body and mind with excellent choices.

REFERENCES

Betts, J. G., Young, K. A., Wise, J. A., Johnson, E., Poe, B., Kruse, D. H., Korol, O., Johnson, J. E., Womble, M., & DeSaix, P. (2022). *Anatomy and physiology*. OpenStax.
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FEMM Teacher Training Course, Sessions 1 & 2

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