PURPOSE

Students will learn about the eleven body systems and their function in the body, recognizing that the reproductive system has a major impact on overall health.

LEARNING OBJECTIVES

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

1. Identify 11 body systems and their components.
2. Understand that every system in the body must function properly for the whole body to be healthy**.**
3. Identify the four primary female reproductive hormones: estrogen, progesterone, follicle stimulating hormone, and luteinizing hormone.

MATERIALS & RESOURCES

- **Lesson 1 teenFEMM** powerpoint
- **Body Systems Worksheet**
- **"Who Am I?"** Activity

Supplemental Video: What is Homeostasis?

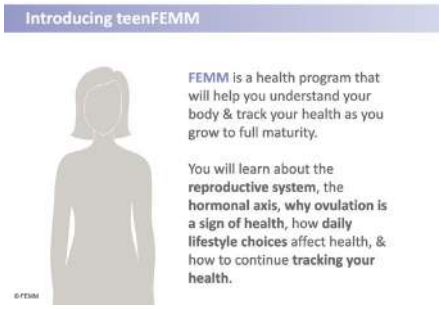
VOCABULARY

- **Body system**: Groups of organs working together for a certain purpose.
- **Hormones:** Chemical signals that travel in the bloodstream, directing the activity of every system in the body.
- **Puberty:** Time when physical and sexual characteristics mature due to hormonal changes (typically between 9-14 years old for a girl, and 10-17 years for a boy).
- **Maturity:** The growth to full development of the body, brain, and emotions.
- **Endocrine System:** The glands throughout the body that produce and release hormones.
- **Homeostasis**: A state of balance between interdependent systems.

- **Hormonal Axis:** The system of communication between a woman's brain and ovaries; it regulates female hormones that affect the reproductive system and overall health.

PROCEDURE

Step 1 (5 minutes): *Introduce teenFEMM health program*

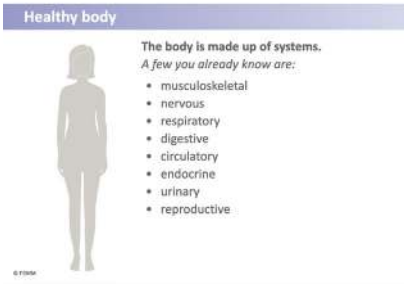


teenFEMM is a health program that will help you understand your body and track your health as you grow and mature. Through this course, you will learn that ovulation is an important sign of health. You will also continue to learn about how important it is to chart and create a health record for yourself. Identifying your body's ovulation within two years of the onset of your first menstruation is important as ovulation is a sign of overall health and wellness.

This course will also teach you about the many fascinating things that hormones do. You probably already know about estrogen and progesterone, but there are two other extremely important reproductive hormones, called: Follicle Stimulating Hormone (FSH) and Luteinizing Hormone (LH). For women and men, hormones impact every system in the body. So, we have a lot to cover!

teenFEMM classes will continue every year through grade 12. There are 6-8 lessons per year, 45 mins to an hour each. By the time you're ready to graduate, you will be a health expert!

Step 2 (2 minutes): *Healthy Body*



As you know, your body is made up of many organs. Each organ has a particular and important job to do, and all of your organs need to work together for your body to be as healthy as possible. When certain parts work together for a similar purpose, they are called a **system**.

Write the following vocabulary definition on the board:

Body system: Groups of organs working together for a certain purpose.

Your body has many **systems**, all working together to make sure you function well.

Step 3 (10 minutes): *Review 9 systems from grade 7, and introduce 2 new systems.*

We learned nine systems in class last year:

- **The muscular and skeletal systems (also known as the musculoskeletal system):** Sometimes these two systems are listed as one because they are so interconnected. The muscles, bones, and joints are attached to each other by different tissues. Ligaments are found at your joints, and their job is to hold bones together. Tendons are found at the ends of muscles, and their job is to connect muscles to bones.

- **The nervous system:** The nervous system controls everything you do, including breathing, walking, thinking, and feeling. This system is made up of your brain, spinal cord, and all the nerves of your body. The brain is the control center and the spinal cord is the major highway to and from the brain. The nerves carry the messages to and from the body, so the brain can interpret them and take action.

- **The respiratory system:** The respiratory system consists of the airways, the lungs and the respiratory muscles that move air in and out of the body.

- **The digestive system:** Digestion (your body using food for energy and growth) takes place in a series of organs that together are called the alimentary canal, or digestive tract. The digestive system consists of a group of connected organs—the mouth, pharynx, esophagus, stomach, small and large intestines, and anus. Through these structures, food is processed via mechanical and chemical action into usable nutrients and expendable waste. Although the liver, gallbladder, and pancreas play a critical role in digestion, they are not part of the digestive tract itself.

- **The cardiovascular (or circulatory) system:** The circulatory system is made up of blood vessels that carry blood away from and towards the heart. Arteries carry blood away from the heart and veins carry blood back to the heart. The circulatory system carries oxygen, nutrients, and hormones to cells, and removes waste products, like carbon dioxide.

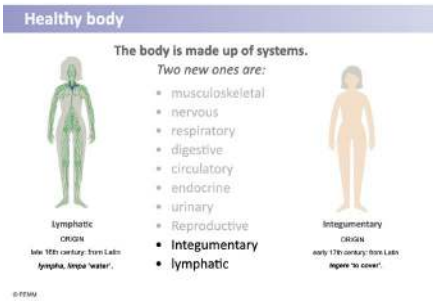
- **The endocrine system:** controls and regulates body processes by means of chemical messengers called hormones. The system is composed of a group of ductless glands located throughout the body that produce hormones in response to the body's needs. Once released, hormones may act on nearby structures, or they may travel in the blood to distant target organs.

- **The urinary system:** The various activities of the body create waste by-products that must be expelled in order to maintain health. To excrete certain fluid wastes, the body has a specialized filtering and recycling system known as the urinary system.

- **The reproductive system** is key to our overall health, as healthy hormone levels have an impact on our whole body. It is also responsible for bringing about a new life. In women, it includes the ovaries, fallopian tubes, the uterus, vagina, and

breasts. In men, the reproductive system includes the testes, scrotum, penis, and all the tubes through which sperm travels.

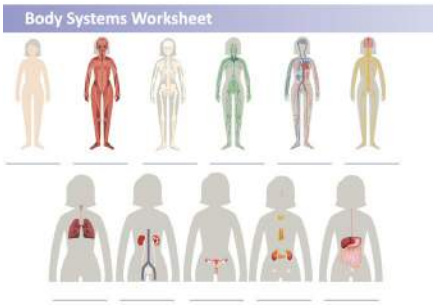
There are two additional body systems to learn about, bringing us to a total of 11 systems:



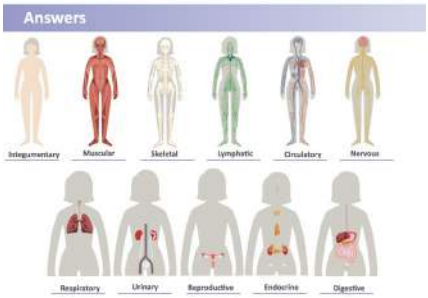
- The **integumentary system** is made up of the organs which form the outermost layer of our bodies. These organs are the skin, hair and nails. This system has many important functions which include providing protection, sensing the world around us, regulating body temperature, preventing moisture loss, and synthesizing vitamin D. As you know by now, this system goes through some big changes during puberty. Increased oil production by glands in the skin during puberty due to hormonal changes is one of the more noticeable (and sometimes frustrating) things teenagers often face.

- The **lymphatic system** is a network of organs which works to balance body fluid and fight against infection. It is part of the immune system. It consists of lymph vessels which connect to all of the lymph nodes throughout the body.

Now let's look at all of the body systems and name them.
*Hand out the **Body Systems Worksheet** for students.*



*Give students a few minutes to fill in the blanks and name as many systems as they can on their own. Then, go over the **answers** together as a class using the next slide.*



The body is made up of many systems. Every system of the body must function properly for the body to be healthy.

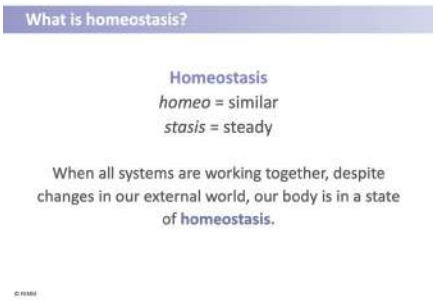
Step 4 (5 minutes): Who Am I? Activity

*Cut out the cards on the dotted line on the **"Who Am I"? Worksheet***

- *Ask for 10 student volunteers for an activity*
- *Provide each volunteer with one card containing a riddle*
- *Have each volunteer read their card aloud to the class and ask the class to guess the system. *Answers are at the bottom of the worksheet page.**

Step 5 (5 minutes): *Introduce the concept of homeostasis.*

When all of the body systems are functioning well, we feel really good and healthy! The maintenance of an organism's internal environment *(i.e. our body)* is called homeostasis. When all systems are working together, despite changes in our external world, this is called **homeostasis.** *(Homeo comes from the Greek for "similar" and stasis means "stable.")*



Let's say we go outside after school on a really hot day for a sports practice; eventually we will start to sweat. *Sweating is controlled by which system?* Our *integumentary system!* The fact that we start to sweat is a healthy sign! Sweating is an important function of the integumentary system as if we didn't sweat, our body would overheat, causing other systems to start to malfunction. When the body gets too warm, sweat glands (located all over our body, but in particular the forehead, armpits and groin area) produce sweat. Sweat is mostly water and salt.

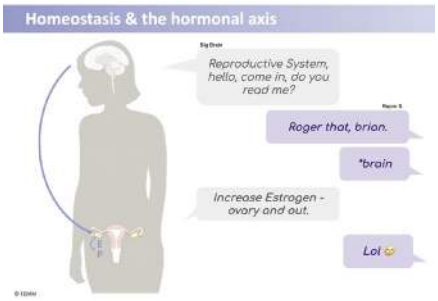
When the sweat evaporates from the skin's surface, the body is cooled as body heat is dissipated. However, maybe you have noticed that when you're hot, you get a bit red in the face. *Why?* It's an amazing reason, actually. When our body temperature increases, our blood vessels expand towards the skin's surface to release excess heat. This is why someone looks "flushed". It's a way that the integumentary and the circulatory system work together to bring our body temperature back to a normal range to achieve… *homeostasis*!

The reaction of our integumentary system to produce sweat, is a way of cooling off the body in order to maintain its ideal temperature. This internal balance that our body maintains (thanks to our 11 body systems), is **homeostasis**.

If time permits and the concept of homeostasis requires further explanation, you may wish to play the supplemental video: What is Homeostasis?

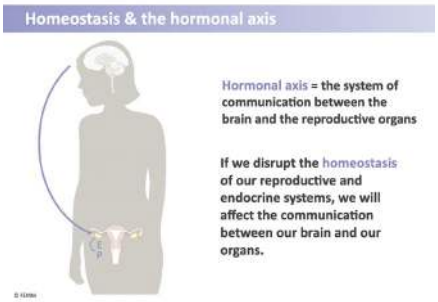
Step 6 (5 minutes): *Connect homeostasis and the hormonal axis.*

It's important to remember that our reproductive system is an integral part of our overall health, too. The reproductive system is not just for some far-off day in the future when we want to reproduce. It's an important system of our body that affects every other body system, too. So, just as the example of sweating is a necessary function of the integumentary system, the process of the ovulatory cycle every month in a woman's body is an indicator of the health of the reproductive system.



Our endocrine system (which controls our hormones) affects our nervous system. And our nervous system controls almost all of the body's processes! So, if all of these messages between the brain and reproductive system are not being sent or properly received, it will affect our mental and physical health, as well as our growth and development!

The special link between the brain and the reproductive system is called the **hormonal axis.**



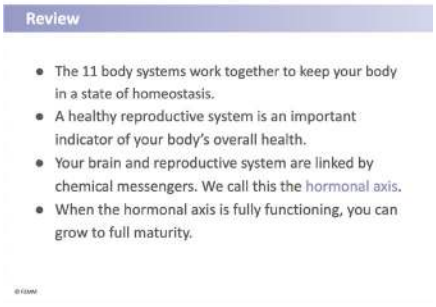
The hormonal axis is a way of describing this invisible arc or line (as shown on the slide)

linking the brain and the ovaries in particular communication throughout a woman's life, from puberty and beyond.

Write the following vocabulary definition on the board:

Hormonal Axis: The system of communication between a woman's brain and ovaries; it regulates female hormones that affect the reproductive system and overall health.

Review


Review

- The 11 body systems work together to keep your body in a state of homeostasis.
- A healthy reproductive system is an important indicator of your body's overall health.
- Your brain and reproductive system are linked by chemical messengers. We call this the hormonal axis.
- When the hormonal axis is fully functioning, you can grow to full maturity.

CONCLUSION

Every human person has the eleven body systems we've discussed in this class. The health of every individual depends on all of these systems properly working together in the state called **homeostasis**. This is why a healthy reproductive system is an important indicator of the health for the rest of the body's systems (as one system impacts all of the others). The way that the brain and the reproductive system are linked is called the **hormonal axis**. When the hormonal axis works properly, all of its components are able to do their jobs and help adolescents grow to full **maturity**. In the next lesson, we will review female reproductive system anatomy and male reproductive anatomy.

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. https://openstax.org/details/books/anatomy-and-physiology

Billman, G.E. (2020). Homeostasis: The underappreciated and far too often ignored central organizing principle of physiology. *Frontiers in Physiology*, *11*. https://doi.org/10.3389/fphys.2020.00200

Strauss, J. & Barbieri, R. (Eds.) (2009). *Yen and Jaffe's Reproductive Endocrinology: Physiology, Pathophysiology, and Clinical Management.* Elsevier Health Sciences.

teenFEMM

Reproductive Anatomy

teenFEMM – Grade 8 | Lesson 2

PURPOSE

To teach the anatomy of the female reproductive system in detail. To introduce the anatomy of the male reproductive system.

LEARNING OBJECTIVES

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

1. Identify the anatomical parts of the female reproductive system.
2. Identify the anatomical parts of the male reproductive system.
3. Understand how all of the parts of the reproductive system work together.
4. Recall that hormones are important to a healthy functioning body.

MATERIALS & RESOURCES

- **"Entry Ticket" Activity** on homeostasis
- **Lesson 2 teenFEMM** powerpoint
- **Female Anatomy Quiz** Worksheet & slides
- **Male Anatomy Quiz**: Worksheet & slides

VOCABULARY

- **Human Reproduction:** When a woman and a man together produce a new human life. This requires a cell from both a man (sperm) and a woman (egg or ovum).
- **Reproductive System:** The group of organs in the lower abdomen/pelvis that work together, with different results in men and women: in men, the reproductive system works to produce sperm (male cell of reproduction); in women, the reproductive system works to mature an egg (female cell of reproduction) and support the growth and development of a baby.

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Female Anatomy Vocabulary:

- **Ovary:** Two small organs on either side of the uterus that contain a woman's eggs. The ovary is responsible for developing and releasing an egg approximately once every month.
  Ovulation: The release of an egg from the ovary.
- **Fallopian Tube:** Two tubes, connected to either side of the uterus, where the egg travels after ovulation.
- **Uterus:** The uterus (also called the 'womb'), is where all of us begin to grow. It's a hollow organ that expands during pregnancy as a baby grows.
- **Cervix:** A narrow canal at the base of the uterus that opens into the vagina.
- **Vagina:** The canal that connects the uterus to the outside of the body. It's the entrance to the reproductive organs and exit in the case of delivering a baby.
- **Urethra:** The tube that carries urine from the bladder to the outside of the body.
- **Anus:** The opening for waste matter from the digestive system to exit the body.
- **Endometrium:** The mucous membrane lining of the uterus which thickens in preparation to provide support and nutrition for a developing baby.

Male Anatomy Vocabulary

- **Scrotum:** A protective sac of skin, located outside the body, containing the testicles.
  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.
- **Urethra (male):** A tube that begins at the bladder (organ that holds urine) and ends at the penis. The urethra carries both urine and sperm out of the body, but these are never released at the same time.
- **Penis:** Allows for the passage of urine out of the body through the urethra, or semen containing sperm.
- **Semen:** The fluid containing sperm.
- **Anus:** The opening for waste matter from the digestive system to exit the body.

PROCEDURE

Step 1 (10 minutes): "Entry Ticket" Activity

Print and cut out an **"Entry Ticket"** per student.

- Greet students at the door as they enter the classroom and give each student an "Entry Ticket"

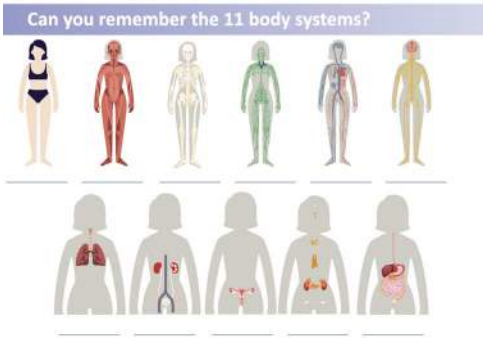
- Have students write their answers down on the back of the ticket and review questions and answers as a class:

    - What do the Greek words '*homeo*' and '*stasis*' mean? *(Homeo means 'same', stasis means 'stable'.)*
    - Give one example of homeostasis that occurs in your body when you do sports? (E.g., *You get hot and your body starts to sweat to cool off. You get thirsty from sweating, you want to drink water to replace the lost water from sweating.)*
    - Sketch a quick illustration of homeostasis. *(E.g., Can be an image of a scale, of an activity, etc.)*
    - How many of the 11 body systems can you name? *(Muscular, Skeletal, Nervous, Respiratory, Digestive, Cardiovascular, Urinary, Endocrine, Reproductive, Integumentary, Lymphatic)*
    - What is the hormonal axis? (*The hormonal axis is the system of communication between the brain and the reproductive organs.)*
    - What is the name of the body system that comes from the latin *tagere 'to cover'. The integumentary system - as the skin is like a covering over the body.*

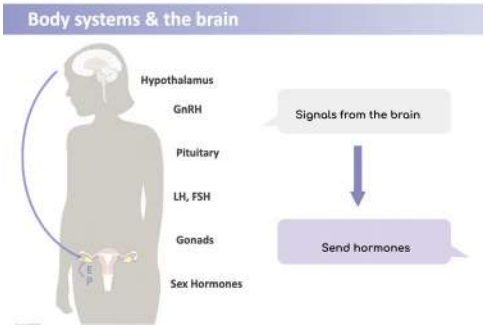
Step 2 (5 minutes): Review body systems, hormones, and puberty

teenFEMM

In the last lesson, the class learned about the 11 body systems. Can you name the 11 body systems? *See if students can name all 11 body systems and then review the answers on the next slide.*



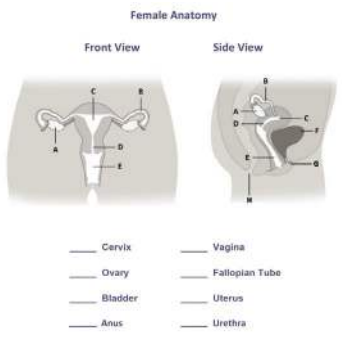
Signals from the brain or "text messages" are sent throughout your body to direct all of the growth and change that you are going through now, in puberty. Do you know what these signals or "text messages" are called? *Hormones!*

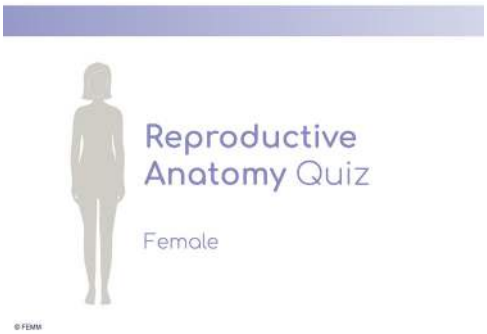


In this lesson we are going to learn more about the male and female reproductive systems and how hormones impact health.

Step 3 (10 minutes): Overview of the female reproductive system anatomy.

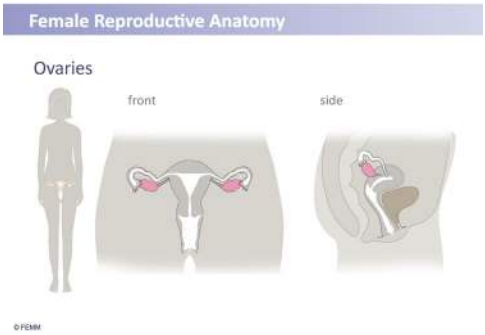
*Hand out the **Female Anatomy Worksheet** and see if students can label the parts.*



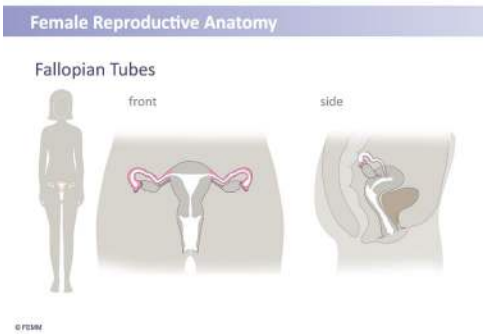


Provide students with a few minutes to complete the worksheet, before reviewing the anatomy together as a class using the answers on the PPT slides provided. Have students check their answers while reviewing the following slides.

The reproductive organs are the group of organs in the lower belly/pelvis that work together in women to mature an egg (female cell of reproduction) and develop a growing baby.

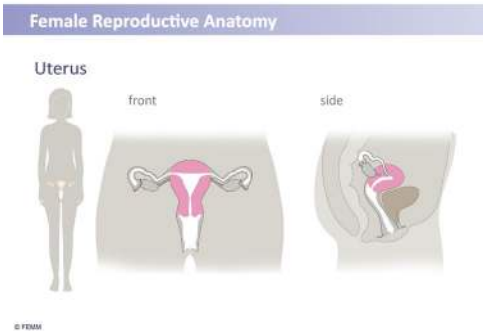


The **Ovaries** are small organs/glands that sit on either side of the uterus. The ovaries take turns; each month one is responsible for developing and releasing an **egg**. The egg is the female cell of reproduction. The woman's ovaries store her eggs from birth. When an egg is released from the ovary, this is called **ovulation**. Ovulation is a very important event that should occur each month in a healthy woman who has already gone through puberty, regardless of whether a woman is ready to have a child or not. Why? One reason is that the **egg**, as it develops, produces **estrogen,** which your body needs**.**



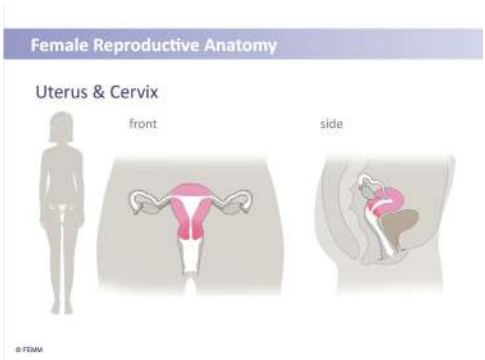
The **Fallopian Tubes** are long thin tubes that are situated on either side of the uterus, providing a way for the egg to travel from the ovary to the uterus. They are not actually

connected, but contain fingerlike projections called **fimbriae** that grab the egg and move it into the tubes. They are about the width of a spaghetti noodle.



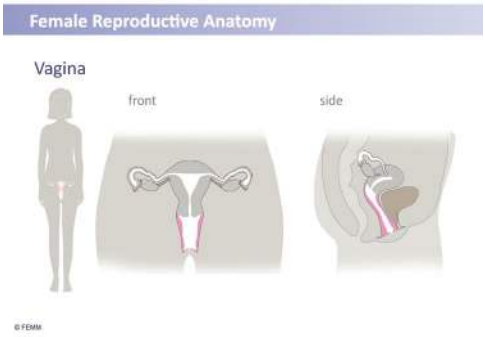
The **Uterus** is the hollow, pear shaped organ in which a baby can grow and develop. The lining of the **uterus** is shown in light pink. The lining of the uterus is called the **endometrium**. This mucus membrane lining responds to an increase in hormones each month to thicken in preparation to someday support a possible pregnancy. The uterus is very strong and stretchy and can grow up to 1,000 times its size as the baby grows. When a woman becomes pregnant, the baby attaches to this lining to receive the nourishment it needs to grow. But if a woman does not become pregnant, then this lining sheds at the end of her ovulatory cycle, in what we know as menstruation and her hormonal levels decrease once again.

The **Cervix** is the opening at the base of the uterus; a narrow canal that opens into the vagina. **Cervical mucus is a fluid produced by the cervix**. Your cervical mucus changes throughout your menstrual cycle.

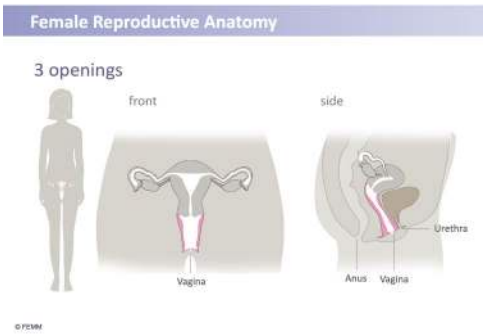


The **vagina** is the canal that connects the uterus to the outside of the body. It is the entrance to the reproductive organs in sexual intercourse. It is also the exit for menstrual

blood each cycle. It is the exit when a baby is delivered - and for this reason, It is sometimes also referred to as the birth canal.

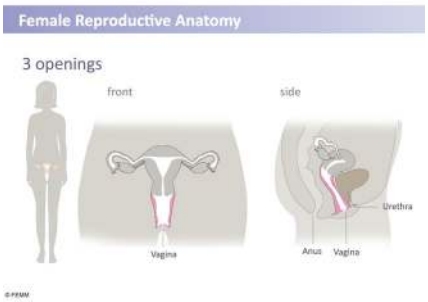


The organ in brown on the right hand side of the slide is the **bladder**.



The bladder is not part of the reproductive system, but rather part of the **urinary system**. The **urethra** is the tube that carries the urine (pee) from the bladder to the outside of the body. The opening behind the vagina is the **anus**. The anus is part of the digestive system. It is the opening for waste to exit the digestive tract.

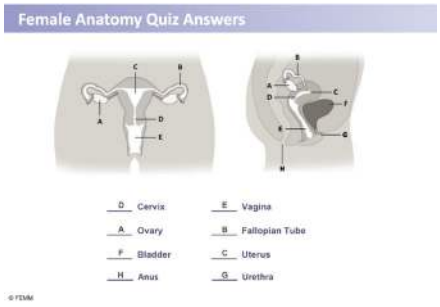
Women have three openings: the **vagina**, the **urethra** and the **anus**.



The proximity of these three openings can increase the risk of bacteria transfer. This means that when using the bathroom, it is important to always wipe **from front to back**

to avoid introducing bacteria from the digestive system towards the vagina and/or urethra. The top and front part of this area is called the pubic area. This is also where hair will grow on the skin and this is completely normal. Men also grow pubic hair in their pubic area.

How did you do on the Female Reproductive Anatomy Quiz? Ask students to tally their score.



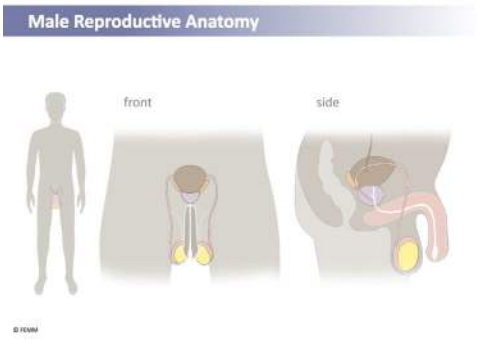
Step 4 (10 min): Introduce the Male Reproductive Anatomy.

As we know, the reproductive system is responsible for bringing about a new life. But a healthy reproductive system is also vital to the overall, everyday health of a person - for both women and men.

Testosterone is the dominant male hormone, and is very important as boys go through puberty; it helps to direct the bodily changes that boys go through: wiring their brains, strengthening their bones, and influencing their mood. Let's learn the names for the different organs that make up the male reproductive system and how they work together to support health.

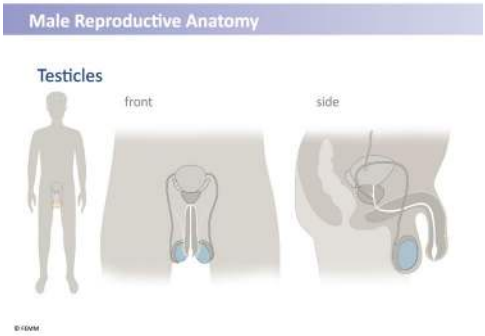
Reference the slides below to define and describe the anatomy of the male reproductive system. There will be a quiz on the Male Reproductive Anatomy, too!

Male Reproductive Anatomy: Here you see the whole male reproductive system.



The testicles are highlighted in yellow. The scrotum is presented in gray, around the testes. The bladder is brown, but just like we reviewed in the female reproductive system it is actually part of the urinary system. The urethra is the tube shown in white that travels through the penis.

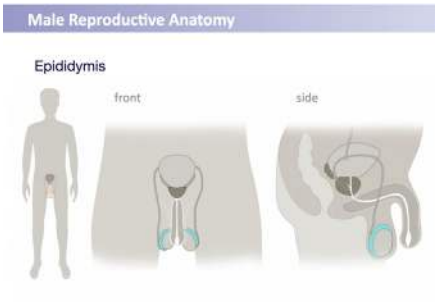
Let's learn about at each of these body system parts more in-depth:



The Testicles are 2 organs that produce **sperm**, the male cell of reproduction.
The testicles (which we also call testes) are also where the main male reproductive hormone is produced. Can anyone name the main male reproductive hormone? ***Testosterone***.

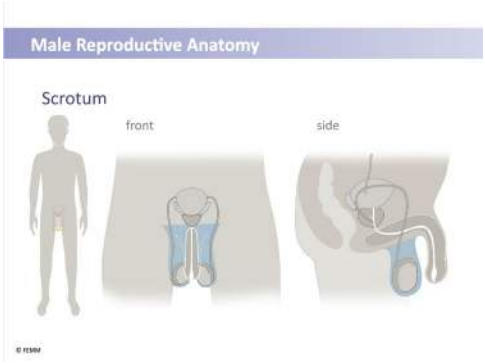
Did You Know? The testicles are located outside the body in order to maintain the ideal temperature for sperm production. Sperm production occurs at around 93.2ºF (34ºC).

This is 5.4ºF (3ºC) below our normal body temperature of 98.6ºF (37ºC). Just those few degrees make all the difference!



Attached to each testicle is the **Epididymis,** a coiled tube or passageway. Sperm is made in the testicles and then travels to the epididymis. In adult males, the length of epididymis (if it was uncoiled and stretched out) is between 20 to 23 feet long! It takes sperm around 4 to 6 weeks just to travel through the epididymis. The human body is amazing!

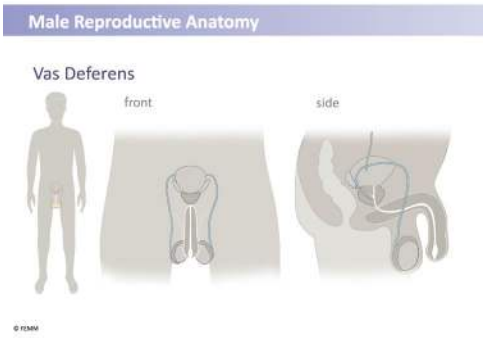
Scrotum: The scrotum is the protective sac that encloses the testes and epididymis and draws them toward or away from the body in order to regulate temperature.



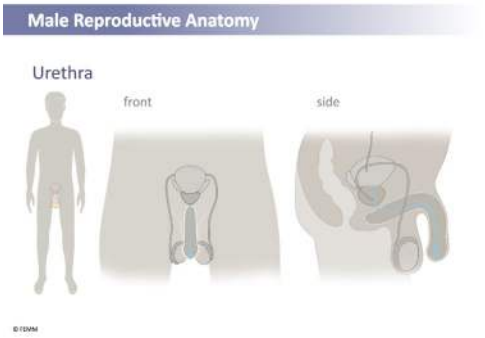
Vas deferens: A tube that transports sperm out of the testicles. There are two vas deferens, one for each testicle. They are about the width of a spaghetti noodle.

*Compare: the **fallopian tubes** are long thin tubes that are situated on either side of the uterus, providing a way for the egg to travel from the ovary to the uterus. They are about the width of a spaghetti noodle.*

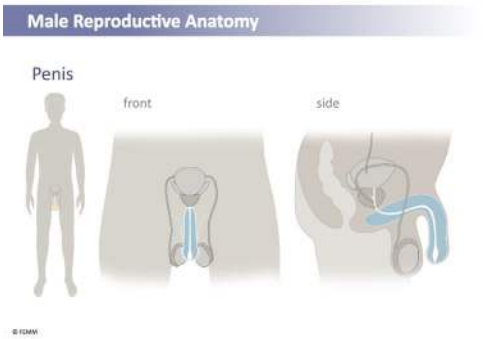
teenFEMM



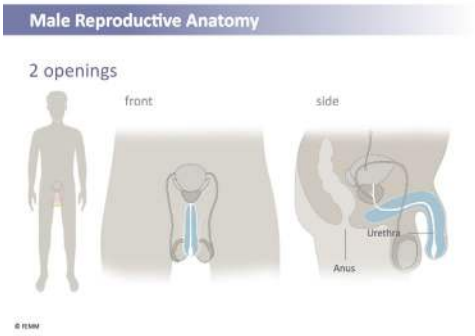
Urethra: The urethra is the tube that travels out the penis and allows either urine or seminal fluid to escape (though never at the same time).



Penis: The penis is actually made up of two parts: the shaft and the glans. The shaft is the main part of the penis and the glans is the tip. At the end of the glans is a small slit or opening, which is where semen and urine exit the body through the urethra (either one or the other, not at the same time).



In this final anatomy slide, point out the 2 openings to the body that men have, as opposed to the three that women have, shown in the side image:

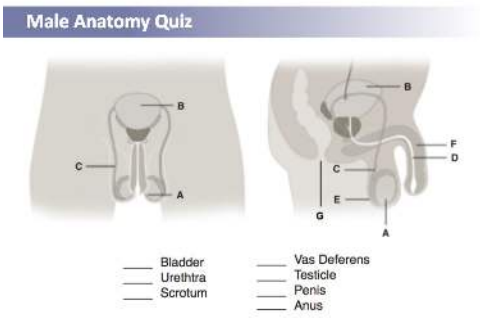


urethra: *tube that travels through the penis, carrying either: 1. urine from the bladder <u>OR</u> 2. semen from the reproductive system.*

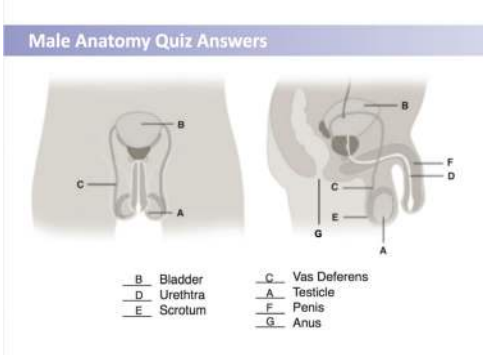
anus*: opening for waste to exit from the digestive system*

Step 5 (5 min): Male Anatomy Quiz *Worksheet & slides*

Provide students with the Male Reproductive Anatomy worksheet and ask them to *fill in the blanks.*



Review their answers using the Male Anatomy Quiz slide (first with blank spaces and once they've made their guesses, show the slide with answers).



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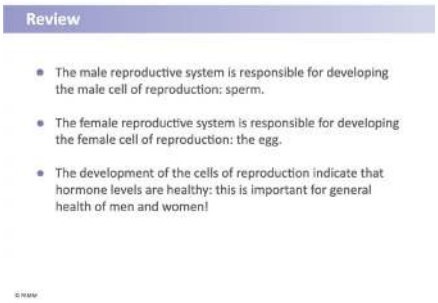
Step 6 (5 min) *(Optional)*: Do you still have any questions about the female or male reproductive anatomy that haven't been covered today? Pass out small slips of paper. Allow the students to place their answers in a question box on the way out of class. These questions can be reviewed next class, if there are any.

CONCLUSION



Now you have a good understanding of the parts that make up both the male and female reproductive systems. The male reproductive system is responsible for developing the male cell of reproduction: the sperm. The female reproductive system is responsible for developing the female cell of reproduction: the egg. While this is obviously important for reproduction, it is important to remember that it's also necessary for all of this to take place in your body for your general health. **For both boys and girls, the most important thing to remember right now is that the development of the cells of reproduction is an indicator of healthy hormone levels as you continue through puberty**. In the next lesson, we will focus on ovulation and hormones, paying attention to what this means for your moods, energy and health.

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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. https://openstax.org/details/books/anatomy-and-physiology

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Uenoyama, Y., Tsukamura, H. & Maeda, K. (2014), Kisspeptin and puberty. *The Journal of Obstetrics and Gynaecology Research*, *40*, 1518-1526. https://doi.org/10.1111/jog.12398

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PURPOSE

To teach students about the four main female reproductive hormones (FSH, estrogen, LH, and progesterone) and their role in overall health.

LEARNING OBJECTIVES

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

1. Understand the process of ovulation.
2. Understand the link between hormonal health and ovulation.
3. Understand that the healthy function of the ovary repeats each cycle and is important for development through puberty and beyond.

MATERIALS & RESOURCES

- **Lesson 3 teenFEMM** powerpoint
- ***Why is Ovulation Important?*** Worksheet

VOCABULARY

- **Reproductive System:** The group of organs in the lower abdomen/pelvis that work together, with different results in men and women: in men, the reproductive system works to produce sperm (male cell of reproduction); in women, the reproductive system works to mature an egg (female cell of reproduction) and support the development of a new life.
- **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.
- **Zygote:** a fertilized egg, which is the beginning of a new human life.
- **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.

There are 4 main female hormones:

- **Estrogen:** The hormone produced by the growing egg/follicle. **Remember: estrogen is produced in the ovary.**

- **Progesterone:** The hormone produced after ovulation. After the egg is released from the ovary, the empty follicle produces progesterone. **Remember: progesterone is produced in the ovary.**

- **Follicle Stimulating Hormone**: The hormone **produced in the pituitary gland in the brain** that stimulates the egg within the follicle to mature. FSH launches the cycle.

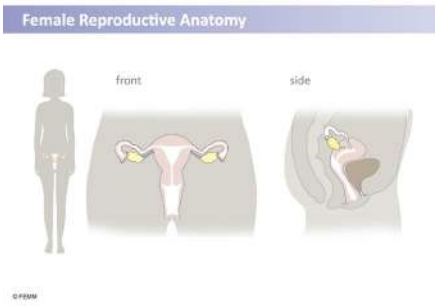
- **Luteinizing Hormone**: The hormone **produced in the pituitary gland in the brain**, that stimulates ovulation in females.

- **Ovulation Cycle**: Approximately once a month, an egg is released from the ovary. If the egg is not fertilized and implantation does not occur, the lining of the uterus sheds once again to prepare to initiate a new cycle. (Because this process repeats, it is called a cycle.)

- **Hormonal Axis:** The system of communication between a woman's brain and ovaries; it regulates female hormones that affect the reproductive system and overall health.

PROCEDURE

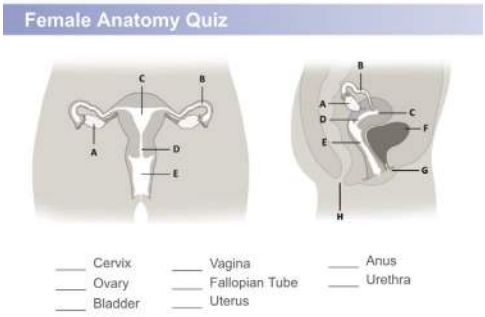
Step 1 (2 minutes): Review answers from "*Do you still have any questions about the female or male reproductive anatomy?*" gathered during last class.



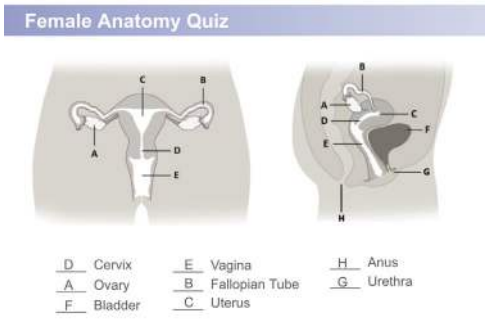
Step 2 (5 minutes): Review the anatomy parts and how they all work together.

Slides: Healthy body; Female Reproductive Anatomy

Let's briefly review the anatomy of the female reproductive system. On this slide, we can see the basic parts, the uterus, endometrium, ovaries, fallopian tubes, cervix, and vagina. In the side view, we can see all of these same parts, as well as the anus, bladder, and urethra. Let's see if we can label these parts as a class.

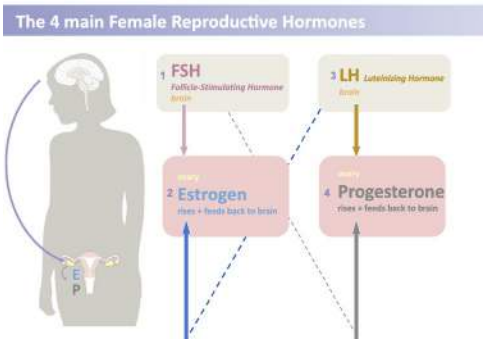


Have students identify the labeled anatomy. When finished, check student answers using the following slide.

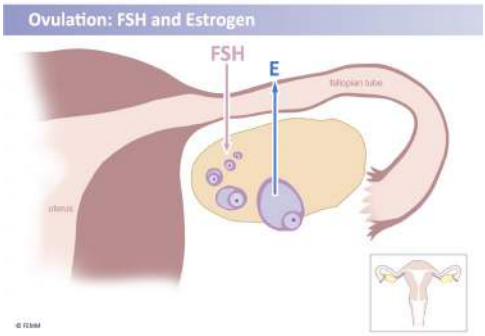


Step 3 (15 minutes): *Introduce the four main female hormones*

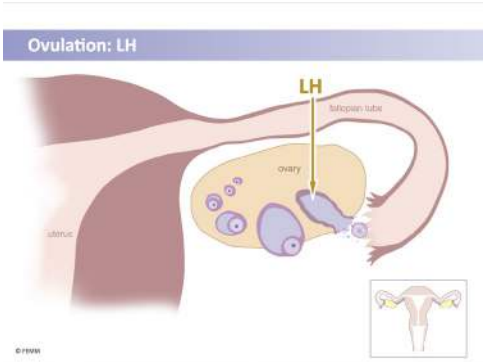
Before we take a closer look at the process of ovulation, it's important to note the four main female reproductive hormones: FSH, estrogen, LH, and progesterone.



Follicle stimulating hormone (FSH) is one of the hormones that starts in the brain, or the command center, of the **hormonal axis.** It does exactly what its name suggests: it sends a message from the brain to the ovaries to select and begin to develop an egg inside of a follicle in the ovary.

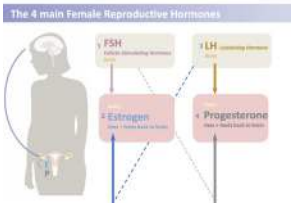


*As the egg and follicle grow, this produces more and more **estrogen.*** **When the level of estrogen is sufficiently high…**

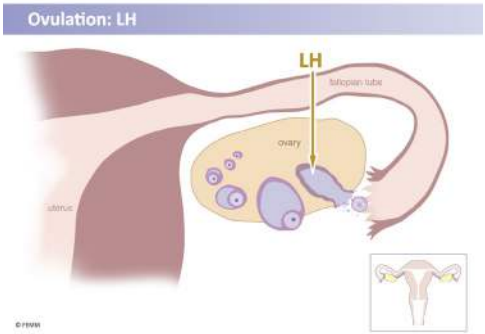


…This sends a message back to the brain to say, “stop FSH” and **triggers the release of LH** (usually around day thirteen of the cycle) another hormone produced in the brain.

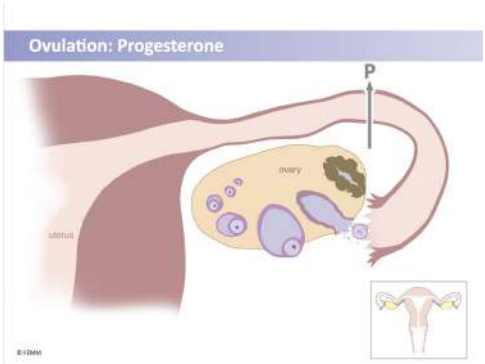
Refer back to the four reproductive hormones slide to highlight the feedback loop/sequence, if helpful:



LH triggers the release of the egg from the ovary, causing ovulation.



At ovulation, the egg is released, grabbed by the **fimbriae**, and swept into the **fallopian tube**, to begin its journey. If intercourse takes place and the egg comes into contact with sperm (the male cell of reproduction), the fertilized egg will then travel through the fallopian tube and to the uterus. If the egg does not come into contact with sperm (the male cell of reproduction), the egg will not be fertilized and pregnancy will not occur.

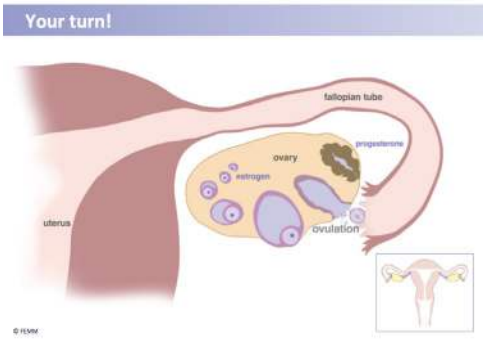


Meanwhile, back in the ovary…. After ovulation, the egg's empty follicle is "recycled" and becomes a new tissue, called the ***corpus luteum,*** that produces the hormone **progesterone**.

'Corpus luteum' means 'yellow body' in Latin, like the yolk of an egg. The corpus luteum produces progesterone which thickens the lining of the uterus until (without fertilization of the egg and implantation in the uterus) hormone levels fall and the uterine lining sheds.

It's kind of incredible what happens in our bodies, every day, every cycle, isn't it?
Did you know? A female egg is 100 microns in diameter. That's about as wide as a strand of hair. That's not that big and yet it's still 20x bigger than the male cell of reproduction: sperm.

Step 4 (5 minutes): *Now it's the student's turn to describe what happens in the ovary each month.*



Ask: **What's the name of the hormone that sends a message from the brain to the ovaries to select and begin to develop an egg?** Follicle Stimulating Hormone **FSH.**

Ask: What happens to the egg and the follicle?
As the egg and follicle grow inside the ovary.

Ask: The growing and maturing egg and follicle produces which hormone?
The growing and maturing egg and follicle produces more and more ***estrogen.***

Ask: What happens when the level of estrogen is sufficiently high?
When estrogen is sufficiently high and the egg and follicle have grown and matured, this triggers the release of another hormone called Luteinizing Hormone (**LH**). LH causes the egg to be released from the follicle in ovulation.

Ask: Where does the egg "travel to" after ovulation?
Once ovulation takes place, the egg travels to the fallopian tube. It's in the fallopian tube that the egg meets sperm, in the case of fertilization. If conception occurs, (sperm fertilize the egg) the fertilized egg will travel down to the uterus and implant there. If fertilization does not take place, the egg simply dissolves in the fallopian tube 12-24 hrs after ovulation.

Ask: Does ovulation mean that pregnancy has occurred?
No. Ovulation is simply what happens in your body, every cycle, as a sign of health that the proper level of hormones are being produced. Pregnancy can only occur if sperm are present around the time of ovulation.

Ask: What happens in the ovary after ovulation?
After the egg has been released from the follicle in ovulation, and has been swept into the fallopian tube…. The empty follicle produces progesterone.

Great job explaining that! So, let's review.
Ovulation is the bursting of the mature egg from the follicle; it happens in the ovary.

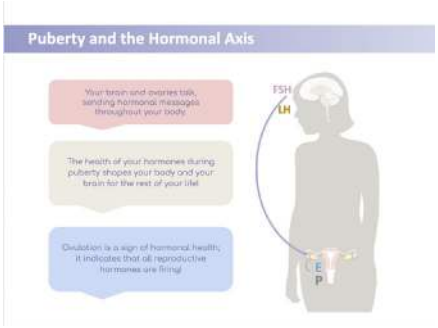
The two main jobs of the ovary are to develop and ovulate an egg, and to produce estrogen and progesterone. The hormone FSH initiates this process, which begins in the brain. As the follicle is stimulated and the egg and follicle start to develop, they produce estrogen. Once estrogen reaches a certain level, it triggers LH to release from the brain. This causes ovulation to happen! After the egg leaves the follicle in ovulation, the left-over follicle is recycled into the corpus luteum and produces the hormone progesterone.

Ovulation happens once a month. This is why in teenFEMM, the monthly cycle is referred to as the **ovulation cycle**.

This is a good moment to acknowledge and mention the other terms for the ovulation cycle that students may be more familiar with: period and menstrual cycle. It is important for them to note that these terms are not wrong, but that the ovulation cycle is more accurate. Using this terminology helps girls and women develop a more positive view of their cycle and begin to recognize why ovulation is considered a vital sign of health.

Step 5 (5 minutes): *Revisit the hormonal axis in the context of ovulation and overall health.*

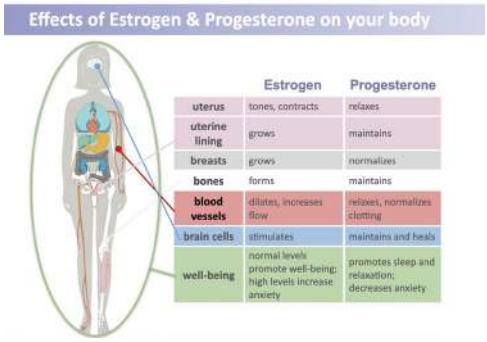
What does it mean to have healthy hormones during puberty? Why is it important to make healthy choices now, and to begin to understand the ovulation cycle before it may even be actually happening every month?



Explain that as you go through puberty, your **hormonal axis** is developing. It is like a type of command center that regulates communication between your brain and your reproductive system.

Your brain and ovaries talk to one another to further your development. As they work together to send hormonal messages from your brain throughout your body in the early stages of puberty, they direct the hormones that stimulate your breasts to grow, hips to fill out, and bones to develop. The overall health of your hormones during puberty determines your body shape for the rest of your life! It also affects how your skin will look, what your mood will be, and how your brain will develop.

Ovulation is the sign of hormonal health. *Why?*



Because ovulation indicates that your brain and your ovaries are communicating well, and that all four reproductive hormones are firing! This slide shows some of the amazing and important things that estrogen and progesterone do for our bodies, during the ovulatory cycle. A tiny thing like ovulation has a number of amazing benefits on a woman's body, like helping you develop strong bones, build muscle and literally even impacts your brain until you are 25 years old.

Step 5: (10 minutes) Worksheet: Why is ovulation important? *(Previous slide can be left on screen/referred to if needed.)*

Hand out the "Why is ovulation important?" worksheet.

Worksheet
Why is ovulation important?

Students can work in groups of 2-3, and see how many reasons for "why ovulation is important" they can remember. The group with the most correct answers, wins!

<u>Possible combined answers:</u>
1. For human reproduction to take place, ovulation must occur.
2. Bone growth and development
3. Breast growth and development
4. Skin balancing
5. Hair growth
6. Optic nerve development
7. Brain pathway development
8. Regulating mood

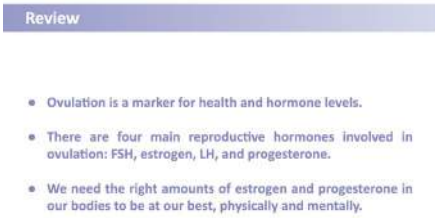
<u>Estrogen has the effects of:</u>
Toning and contracting the uterus
Growing the uterine lining
Growing the breasts
Forming the bones
Dilating the blood vessels
Stimulating brain cell growth
Promoting well being

<u>Progesterone has the effects of:</u>
Relaxing the uterus
Maintaining the uterine lining

Normalizing breast tissue
Maintaining bone growth
Relaxing the blood vessels
Maintaining and healing brain cells
Promoting sleep and relaxation

CONCLUSION

As you can see, ovulation is an extremely fascinating and important event! It is essential for bringing new life into the world, but what we don't often hear is how essential it is as a marker for basic health and hormone levels.



We need the right amounts of estrogen and progesterone in our bodies to feel our best, physically and mentally. In the next lesson, we will begin to learn how to chart or track the physical signs your body gives you that will help you to create a health record for yourself, and to learn more about your body.

REFERENCES

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Vigil, P., Lyon, C., Flores, B., Rioseco, H. & Serrano, F. (2017). Ovulation, a sign of health. *The Linacre Quarterly*, *84*, 1-13. https://10.1080/00243639.2017.1394053

FEMM Teacher Training Course, Sessions 1 & 2

PURPOSE

To develop students' knowledge that ovulation is a regularly repeating process with a purpose: to support the health of the whole body. To reiterate the importance of the hormones FSH, Estrogen, LH, and Progesterone to the entire cycle and overall health.

LEARNING OBJECTIVES

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

1. Understand that ovulation is a sign of health.
2. Understand the female body has a regularly occurring cycle, including menstruation.
3. Understand the effect hormones have on the development of the female brain and body.

MATERIALS & RESOURCES

- **Lesson 4 teenFEMM** powerpoint
- **"Entry Ticket"** activity
- **Worksheet: Ovulation + Menstruation**

VOCABULARY

- **Hormones:** Chemical signals that travel in the bloodstream, directing the activity of every system in the body.

- **Reproductive System:** The group of organs in the lower belly/pelvis that work together: in women, to mature an egg (the female cell of reproduction) and in the future to support a pregnancy and in men, to produce sperm (the male cell of reproduction).

- **Ovulation:** When a mature egg is released from the ovary. In women, ovulation is not just for reproduction but is a sign of health.

- **Ovulation Cycle:** Approximately once a month, an egg is released from the ovary. Because this process repeats, it is called a cycle.

- **Menstruation:** Each cycle, hormones cause the lining of the uterus (the **endometrium**) to thicken. At the end of the cycle, the lining of the uterus breaks down and sheds, which is experienced as menstrual bleeding. (This is also referred to as the 'period.')

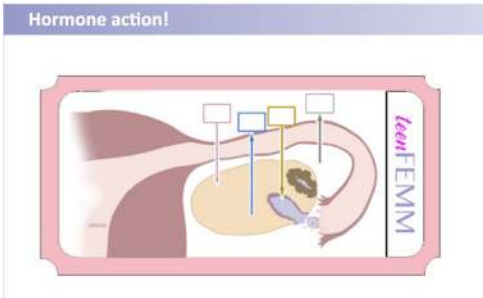
PROCEDURE

Step 1: (5 minutes) Entry Ticket Activity: Hormone Action!

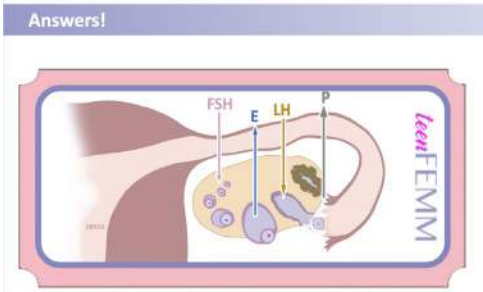
Print and cut out Entry Tickets to hand out as students enter the classroom.

Ask students to label the 4 Main Female Reproductive Hormones as they act on the ovary.

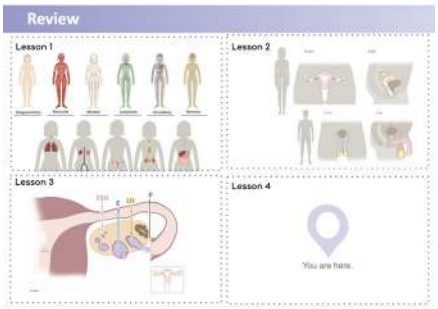
Ask students to draw the egg and follicle as it grows and matures, leading up to ovulation.



When students are finished, show the following slide for the answers: the 4 hormones and illustration of maturing egg and follicle.



***Step 2**: (5 minutes) Review lessons 1-3 and introduce this lesson.*

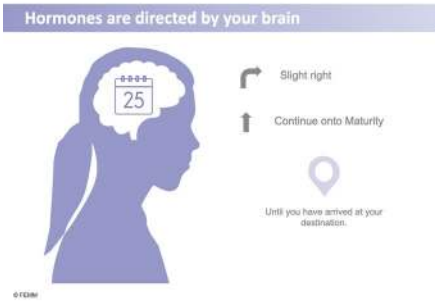


In teenFEMM, we began Lesson 1 by learning about the body systems and how they work together. In Lesson 2, we zoomed in on the female reproductive system and female and male anatomy. In Lesson 3, we looked closely at the process of ovulation, and the four main female reproductive hormones: Follicle-Stimulating Hormone (FSH), Estrogen, Luteinizing Hormone (LH), and Progesterone.

Today, in Lesson 4, we will talk more about why the ovulatory cycle is so important to your overall health and the specific impacts of estrogen and progesterone in the body.

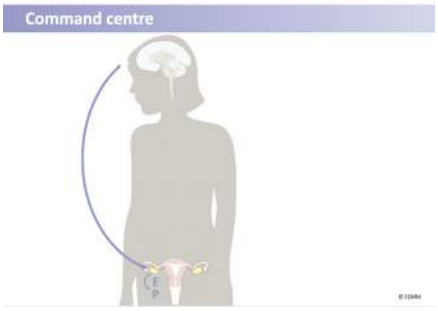
The activity of your whole body is directed by your brain. The ovulatory cycle is not just an isolated event happening somewhere "down there" in your reproductive system. The ovulatory cycle impacts every part of your body - even the maturation of your brain through puberty and beyond!

Do you know at what age the brain is fully matured and developed? 25 years old!



The brain produces its own hormones which direct organs, like the ovaries, to produce other hormones. *Ask: Which of the main female hormones are produced in the brain?* That's right: FSH and LH. As we know, the hormonal axis refers to the chemical signals

(called hormones!) between the brain and your reproductive system.

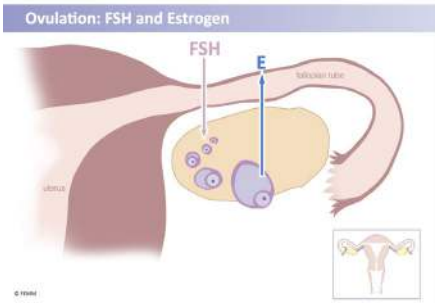


Step 3 (10 minutes): *Describe what happens in ovulation + menstruation.*
Let's review the full cycle, looking at ovulation and menstruation.

Ask: In the first part of your cycle, which hormone, produced in the brain, sends a message to the ovaries to stimulate an egg to grow and develop?
Follicle Stimulating Hormone (FSH).

Ask: In the ovary, the egg is surrounded by a special, protective tissue, called?
A *follicle.* Hence the name, *Follicle Stimulating Hormone.*

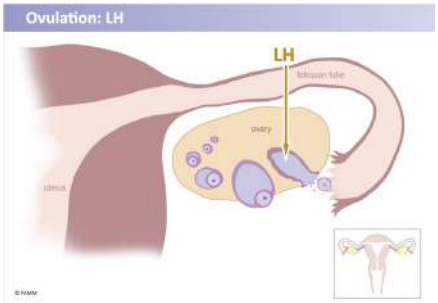
As the slide illustrates, the egg and follicle grow together.



Ask: as the egg and follicle grow together in the ovary, they produce which hormone?
Estrogen.

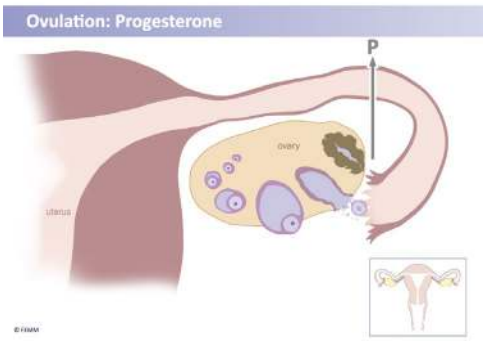
The bigger and more mature the egg and follicle get, the more **estrogen** they make. When the egg is ready, grown to full maturity, it produces peak levels of estrogen. This high level of estrogen in the ovary, feeds back to the brain to say: "stop producing Follicle Stimulating Hormone! The egg is mature!"

Ask: Which hormone, from the brain, triggers ovulation? **Luteinizing Hormone (LH).** This hormone causes the egg to be released from its follicle -- this process is called ovulation -- and the egg travels into the fallopian tube.



In the ovary, the now-empty follicle becomes a new tissue called the **corpus luteum**. The word comes from the Latin '*corpus'* for 'body' and '*luteus'* for 'yellow' as the cells lining the follicle (under a microscope) are yellow in pigment.

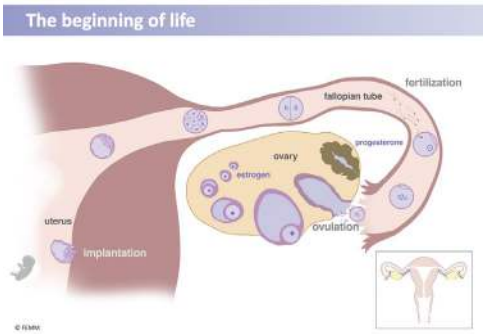
Ask: The corpus luteum secretes (makes) which hormone? **Progesterone.** Progesterone is a super awesome hormone that every strong female body needs! Progesterone promotes mental well-being, sleep, and relaxation.



Now, maybe you're thinking: wait, *what happens to the egg after ovulation, again?* On its own, the egg simply dissolves in the fallopian tube after 12-24 hours. Progesterone levels peak and then after 10-14 days the corpus luteum becomes inactive and progesterone levels fall and the lining of the uterus sheds.

Ask: What's the shedding of the uterine lining called ? **Menstruation.** Menstruation typically lasts from 3-7 days in a normal and healthy cycle.

If the egg joins with the male cell of reproduction (sperm) it becomes a fertilized egg, also known as a zygote. This newly formed life travels to the uterus, where it embeds in the uterine lining (wall).



In the case of pregnancy, progesterone will continue to rise, maintaining the lining of the uterus, in order to make it a nourishing place for a baby to grow for the next 9 months.

But back to right now. It's important to remember that the ovulatory cycle is not just important for some far-away down the road reproductive goal. Ovulation is a general indicator of your body's health, as both Estrogen and Progesterone are important hormones your body needs, and in the right amounts. Estrogen and progesterone work together to strengthen and build bones, ensure breast development, impact skin and hair, and influence and change your brain and emotions.

Step 4 (10 minutes): *Expand upon the term "cycle."*
*What are the 2 main jobs of the **ovaries**?*

To grow and release an egg (ovulation) each cycle.
To make the hormones estrogen and progesterone.

This whole process - of growing and releasing an egg, and producing the hormones Estrogen and Progesterone - is called a cycle because it repeats about every 24-36 days.

Every woman has a cycle, beginning in puberty until around age 50. We call it the **ovulation cycle** rather than the *menstrual cycle*, because *ovulation* is the main event. The word ovulation comes from the latin word "ova" which means egg. Ovulation refers to the entire hormonal process in which the egg is released.

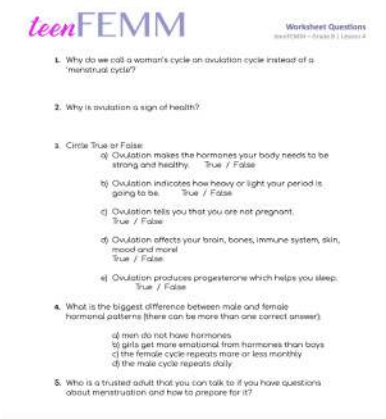
You can think of it this way: *your period comes at the end of the ovulatory cycle, just like a period comes at the end of a sentence.*

Did you know? Men have hormonal cycles, too? It's true! But the main difference between the male and female hormonal pattern is that the male pattern repeats daily, as opposed to monthly. For instance, typically, testosterone levels are higher in the morning and lower at night. *So, the next time someone says you're "hormonal", you can remind them that the hormone testosterone can also lead to outbursts, emotional instability, irritability and fluctuation in mood. :)*

For both males and females, lifestyle impacts hormones and their effects. In addition to managing symptoms as they come, finding ways to relieve stress is important as the body matures through these hormonal changes. This includes exercise, eating a healthy diet and getting 8 hours of sleep every night!

Step 5 (5 min): *Worksheet: Ovulation + Menstruation*

Hand out the *Worksheet* *to students and give them a few minutes to complete. Review the correct answers by using the* *Worksheet: Teacher's Answer Key* *provided in the lesson folder.*


teenFEMM Worksheet Questions

1. Why do we call a woman's cycle an ovulation cycle instead of a 'menstrual cycle'?

2. Why is ovulation a sign of health?

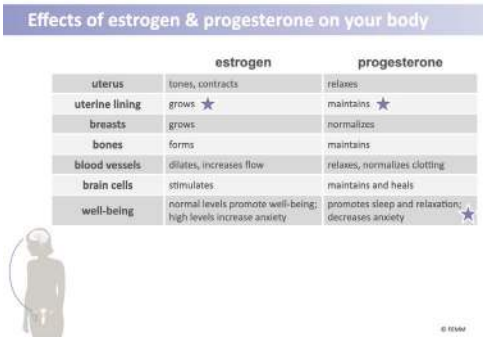
3. Circle True or False:
   a) Ovulation makes the hormones your body needs to be strong and healthy. True / False
   b) Ovulation indicates how heavy or light your period is going to be. True / False
   c) Ovulation tells you that you are not pregnant. True / False
   d) Ovulation affects your brain, bones, immune system, skin, mood and more! True / False
   e) Ovulation produces progesterone which helps you sleep. True / False

4. What is the biggest difference between male and female hormonal patterns (there can be more than one correct answer):
   a) men do not have hormones
   b) girls get more emotional from hormones than boys
   c) the female cycle repeats more or less monthly
   d) the male cycle repeats daily

5. Who is a trusted adult that you can talk to if you have questions about menstruation and how to prepare for it?

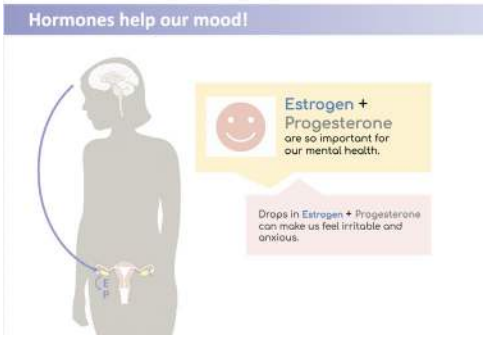
Step 6 (10 min): *Expand on the importance of estrogen and progesterone to health.*

Have you ever noticed that you feel different at different times in your cycle? Let's look at this chart, to examine the specific effects of estrogen and progesterone on the body.


Effects of estrogen & progesterone on your body

	estrogen	progesterone
uterus	tones, contracts	relaxes
uterine lining	grows ★	maintains ★
breasts	grows	normalizes
bones	forms	maintains
blood vessels	dilates, increases flow	relaxes, normalizes clotting
brain cells	stimulates	maintains and heals
well-being	normal levels promote well-being; high levels increase anxiety	promotes sleep and relaxation; decreases anxiety ★

Mood



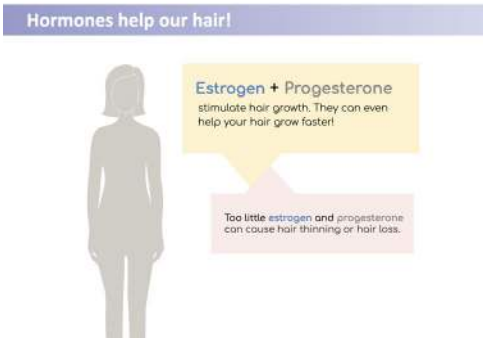
Do you feel the same when you have your period as you do when you don't? Right before your period, do you feel a bit more worried and anxious than usual? That's because progesterone is dropping. *And what does Progesterone do?* **Progesterone promotes sleep and relaxation and decreases anxiety!**

It's important to make a note of these emotional and mental health changes, so that you can remember to be gentle with yourself. These are patterns that will help you understand your cycle and yourself better. After all, we have learned a lot about how much hormones influence your brain! It is very common to experience mood changes as you go through puberty. It is normal to feel different emotions at different times in the cycle, even after your cycles regulate.

Bones (height/size and density)

As you go through puberty, your bones are growing rapidly. Your bone and mineral density are increasing. By the time you are cycling regularly, you most likely will not grow any taller. A woman's bone mass peaks between ages 19 and 40. Proper hormone levels are necessary to achieve optimum bone mass so your bones stay strong and are not as susceptible to breaks.

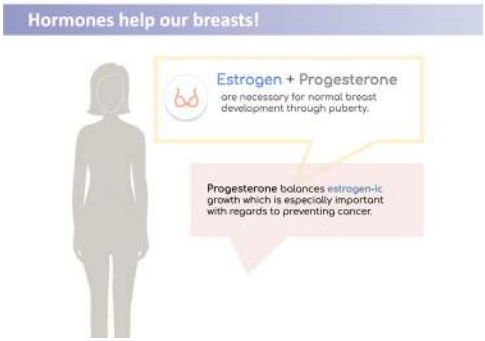
Hair



As estrogen rises during puberty, girls will begin to notice pubic and underarm hair, in addition to increased sweating. This is totally normal and healthy. Deodorant can be

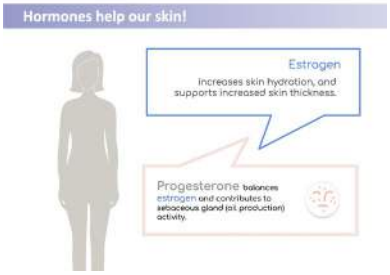
used, applied under the arms once in the morning; you can reapply if you have a sporting event or another activity that might cause more sweating later in the day. Is there a trusted adult you can talk to about your personal care routine? The timing, products, and methods can be different for each girl.

Breasts



Increasing hormones promote breast growth, and it takes several years for breasts to fully mature. In the first stage of development, the nipple and area surrounding the nipple (called the areola) begin to expand. Then, the breasts continue to enlarge until they reach their full size. It is not uncommon for one breast to grow faster than the other, or to experience soreness as they grow.

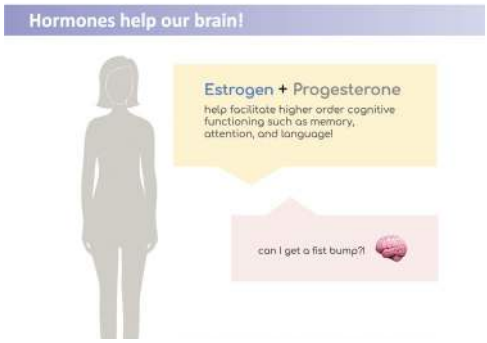
Skin



Hormones are working hard in your body throughout puberty. Sometimes when they work a little too hard, you can end up with acne, which is when there is an overproduction of oil in the glands in your skin. Making healthy choices with diet and exercise can support overall hormonal health to keep your skin healthy and clear into the future. We will talk more about making healthy choices in the next lessons.

Brain

A girl's brain is not fully developed until she is 25, so hormones play a key role in developing all of the essential brain pathways and processes.
Hormones influence how structures of the brain grow and what parts of it are activated in certain situations or environments.



CONCLUSION

Now that we've learned about the importance of having an ovulatory cycle for our health, and what the hormones progesterone and estrogen do to balance and develop our body and brain, next lesson we will learn how we can track the specific characteristics of our cycle. Tracking this information is called "charting" and it's helpful information to know about our bodies and our health.

REFERENCES

del Rio, J. & Alliende, I. & Molina, N. & Serrano, F. & Molina, S. & Vigil, P. (2018). Steroid hormones and their action in women's brains: The importance of hormonal balance. *Frontiers in Public Health*, *6*, https://doi.org/10.3389/fpubh.2018.00141

Vigil, P., Ceric, F., Cortés, M.E., & Klaus, H. (2006). Usefulness of monitoring fertility from menarche. *Journal of Pediatric Adolescent Gynaecology*, *19*(3), 173-9. https://doi.org/10.1016/j.jpag.2006.02.003

Vigil, P., del Rio, J., Carrera, B., Aranguiz, C., Rioseco, H. & Cortés Cortés, M. (2016). Influence of sex steroid hormones on the adolescent brain and behavior: An update. *The Linacre Quarterly, 83*, 308-329. https://doi.org/10.1080/00243639.2016.1211863

PURPOSE

To help students deepen their awareness of the brain and hormone connection and confidently identify hormonal biomarkers in a cycle chart.

LEARNING OBJECTIVES

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

1. Understand the connection between hormones, the body and the brain.
2. Know the specific roles of estrogen and progesterone in their health.
3. Identify the body's reproductive health hormonal biomarkers.

MATERIALS & RESOURCES

- **Lesson 5 teenFEMM** powerpoint
- **Review Activity: Puzzle** (students will need scissors to cut out puzzle pieces)
- **Benefits of Progesterone and Estrogen Worksheet**
- **Worksheet: Biomarker Symbols Chart** + Teacher's Answer Key
- **Practice Chart** (students will need pencil crayons, black pen)
- FEMM Chart

VOCABULARY

- **Charting:** learning to identify and write down reproductive health biomarkers.

- **Biomarkers:** signs of hormonal and other changes in your body. Biomarkers include fluids such as menstruation and cervical fluid, and other physical and emotional symptoms.

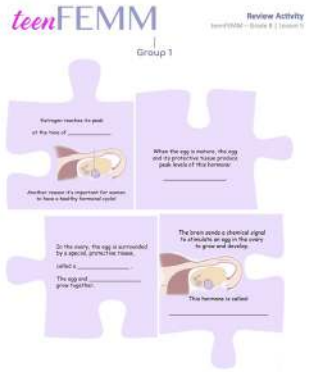
- **Cervical Fluid (mucus):** Fluid secreted by the cervix which changes in consistency (dry/moist) based on changing hormone levels.

- **Menstruation/Period:** At the end of each cycle the lining of the uterus sheds, which causes bleeding.

PROCEDURE

Step 1 (10 minutes): *Review Activity: Puzzles*

Divide class into three groups to complete the three puzzles. Give each group a printout.



Instructions:

1. Fill in the blanks on each puzzle piece

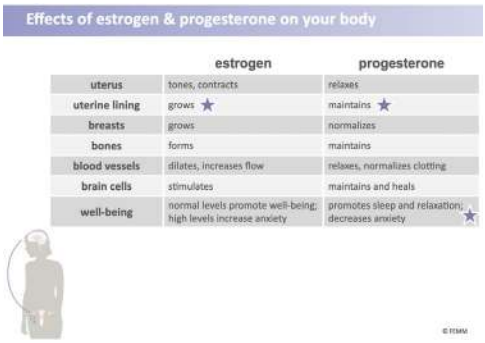
2. Cut out the pieces and complete the puzzle.

3. Once groups have completed their puzzle, have the class arrange the three puzzles in order of cycle events.

Step 2 (5 min): *Introduce Lesson*

As we have been discussing in these lessons, hormones direct all of the physical changes of puberty. Hormones also direct all of the physical changes every cycle that cause an egg to develop and ovulate in the ovary, the lining of the uterus to shed in menstruation, etc. All of these changes are happening inside of us - and we don't even have to think about them! But the cool part is that we can also actually see and feel these changes! This lesson, we're going to look at the body's reproductive health biomarkers and talk about charting the cycle.

It's pretty amazing that as women we can track these signs and have a window into the health of our whole bodies! Let's quickly review what estrogen and progesterone do for our bodies. *Hand out the Estrogen and Progesterone Worksheet to students for them to fill in as you review the following slides together as a class.*



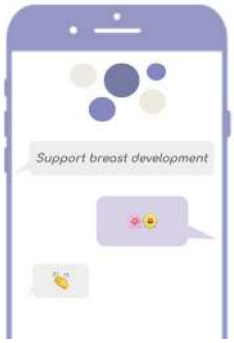
Effects of estrogen & progesterone on your body

	estrogen	progesterone
uterus	tones, contracts	relaxes
uterine lining	grows ★	maintains ★
breasts	grows	normalizes
bones	forms	maintains
blood vessels	dilates, increases flow	relaxes, normalizes clotting
brain cells	stimulates	maintains and heals
well-being	normal levels promote well-being; high levels increase anxiety	promotes sleep and relaxation; decreases anxiety ★

Estrogen and Progesterone strengthen your muscles and bones! You can write that down in the first box on your worksheet.

Which systems are shown here?

Give students a chance to answer "muscular and skeletal systems" (muscle and bone systems) and then have students write this down on their worksheet.

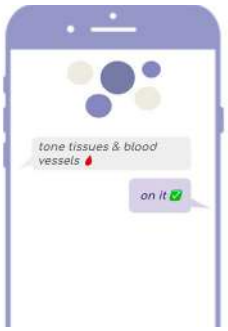


Progesterone and estrogen support breast development. The function of female breasts is to supply milk to an infant. Men do have a variation of breasts, but they lack the lobules that are necessary to produce milk.

Our breasts are part of which body system? *Students should answer "reproductive system" and write this on the blank line of their worksheet.*

Breasts

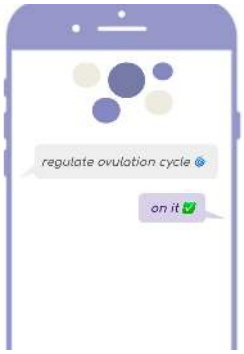
Increasing hormones promote breast growth, and it takes several years for breasts to fully mature. In the first stage of development, small lumps called breast buds appear. The nipple and area surrounding the nipple (called the areola) begin to expand. Then, the breasts continue to enlarge until they reach their full size. It is not uncommon for one breast to grow faster than the other, and to experience a little bit of soreness as they grow.



Progesterone and estrogen tone tissues and blood vessels in this body system:

Which system is this? The circulatory system! You can write that on your worksheet.

Estrogen and progesterone have an essential role in regulating a woman's… *Ovulatory cycle!*



Balanced hormones help you to feel relaxed and prevent anxiety. Progesterone also aids in… sleep! Progesterone and estrogen have a huge impact on mental health!

And last but not least, estrogen and progesterone help the brain! Estrogen stimulates brain cells.

Brain

A girl's brain is not fully developed until she is 25, so hormonal balance will play a key role in helping all of the essential brain pathways and processes to develop and connect properly. Hormones influence how structures of the brain grow and what parts of it are activated in certain situations or environments. Have you ever noticed that your parents or teachers might be able to remain super calm in a situation that has you feeling panicked? This has something to do with the fact that their brains are more developed than yours, which is why they are there to support you!

Step 3 (10 min): *Hand out **Worksheet: Biomarker Symbols Chart**; fill in worksheet together*

Healthy amounts of estrogen and progesterone will change throughout your life. Right now, as you enter puberty, some of you will see signs of estrogen and progesterone before other girls do. Some of you may be just starting to ovulate, but for others it will be perfectly healthy to not be ovulating yet. You may have lower levels of these

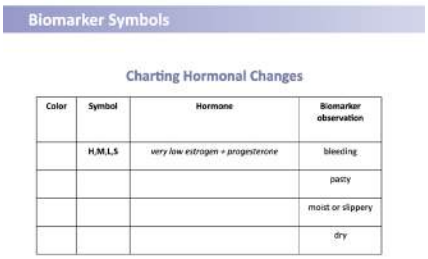
hormones, but they will continue to rise as you grow through your teen years. If you are charting and recording your signs, you will be able to see and understand when this process begins for you and make sure it develops as it should. (*This is important to note. In grade 8, most of the girls will be menstruating, but there will probably be a few who are not.)*

Today we are going to look at charting (or to record on paper) the biomarkers (signs) that you can observe in your body.

By charting these biomarkers, women can understand what our hormones are doing in our reproductive system and throughout our whole body.

*Have students get out their Worksheet: **Biomarker Symbols Chart** and pencil crayons (red, yellow, blue and gray) to fill in the chart together as a class.*

Let's fill in the grid to identify what color we use to chart each hormone and biomarker.



We'll start with the most obvious biomarker. **Bleeding** is a sign that the lining of your uterus, called the **endometrium**, is growing and then shedding. You will know and experience this as your period, or menstruation. This is a normal and vital sign of health. To chart this, what color do we use to note bleeding? *Students should answer "red" and color in the appropriate box on their Biomarker Symbols Worksheet.*

You'll see that there are additional symbols when it comes to your period:
H for heavy

M for moderate
L for light
S for spotting
Spotting is if you have bleeding that is very light, only requires a light pad, and/or is outside the time of your normal menstruation.

A healthy period is one that should last from 3-7 days with at least one day of M or H bleeding if you have had your period for two years or more. Remember that the period comes at the end of the ovulatory cycle, and so estrogen is falling after peak levels during ovulation and progesterone is dropping off after the corpus luteum stops producing progesterone. So during your period (menstruation) both estrogen and progesterone are very low.

Next, after your period, **estrogen** is once again beginning to rise (triggered by FSH in the brain) which acts on every part of your body, including the cervix (the small canal at the base of the uterus), to produce cervical mucus. **Low levels of estrogen** produce low levels of cervical mucus. As this fluid travels down the vaginal canal it can mix with slight shedding of cells in the body. Totally normal. You might notice this as a pasty or crumbly observation on the inside of your underwear, or on a tissue when you wipe. What color do you chart for this type of cervical mucus? "*Yellow*". *Students should color in the box yellow and write down "low estrogen" for Hormone.*

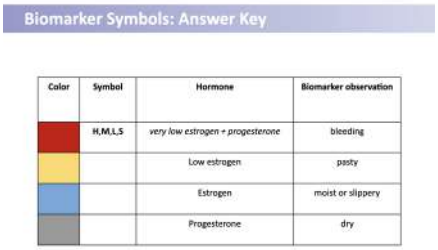
As estrogen continues to rise, you may feel this fluid/wet sensation outside of the vagina. **High levels of estrogen** produce high levels of cervical mucus. You may have had days where you feel some wetness outside of your vagina or you noticed a discharge in your underwear after playing sports. This is normal. Tracking your cycle can help you to recognize that this mucus is normal and healthy!

To chart this fluid sensation, which indicates high levels of the hormone estrogen, we use the color blue. Students should color in the corresponding box blue and fill in the hormone name.

After ovulation, when the corpus luteum in the ovary is producing the hormone Progesterone, this changes the cervical mucus once again and makes a very thick mucus.

Because the mucus is thick, not fluid, like estrogen-type mucus, it doesn't travel towards the vaginal canal and instead of "moist or slippery", progesterone produces a "dry" sensation. ***Gray*** *is the color we use to chart the observation/experience of "dry" and the hormone to write is* ***Progesterone****.*

Have students check their Biomarker Symbol Chart against the slide with the Answer Key.

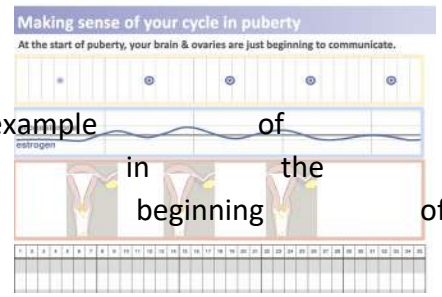


Now that you have this handy **Biomarker Symbol Chart** filled in, you have a great reference for charting the different hormones as they change in your body during the ovulatory cycle.

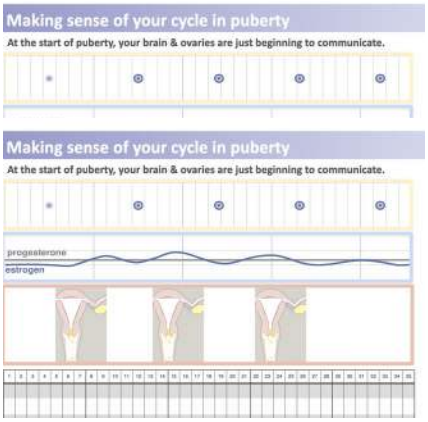
Step 4 (15 mins): Practice Charting *Hand out* ***Practice Chart****; fill in the chart together (For students who took the teenFEMM course in 7th grade: Does anyone remember learning to chart the cycle from last year?)* Do you know anyone who charts their cycle? Did you know that FEMM has a free app for Apple and Android phones to support you in your charting? *Allow students to participate by simply raising hands or sharing anything they might remember from last year.*

At the start of puberty, your brain and ovaries are just beginning to communicate. On this slide we can see multiple levels of the impact of hormonal activity:

The top row (yellow frame) → shows an example of what the egg and follicle in the ovary look like at the beginning of puberty.



The second row (blue frame) → shows a graph of the hormones estrogen and progesterone (both low), with small rises in estrogen in response to the activity in the ovary (above).

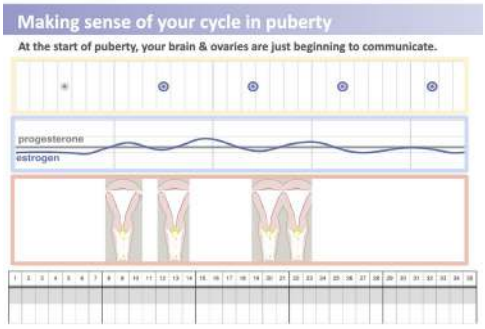


The third row (peach frame) → shows the cervix and how the small rises in estrogen produce small amounts of cervical mucus (biomarkers).

The bottom row is a blank teenFEMM chart. On the far left is the first day of this girl's cycle, and the chart moves from left to right one day at a time.

Based on the follicle activity, the hormone graph and what we know about the impact of different hormones on the cervix, what biomarkers do you think this girl would be experiencing and what would her chart look like? Let's go through it together.

*Hand out the **Practice Chart** from the materials for each student to color in the correct charting symbol as you go through the example together.*



For the first few days of the cycle, we see that estrogen levels are very low. And,

throughout the entire chart, progesterone levels do not change at all! *Why is this?* As we learned in previous lessons, progesterone is made by the empty follicle or "corpus luteum" *after ovulation*. Because this girl is not yet ovulating, her progesterone levels are staying at the same low level. However, because her brain is beginning to send short text messages to her ovaries to "wake up" during this phase of puberty, she produces a very small amount of mucus that mixes with different cells and secretions, which she notices as a pasty or crumbly mucus.

Days 1-8 she doesn't notice anything, and feels dry. What color should we fill in on those days? *Students should answer gray.*
Day 9, right after a small rise in estrogen, she notices a slight change to sticky. Or, maybe it's pasty. What color should she use here, on day 9? *Yellow.*
Days 10, 11, and 12, she feels dry again. What color do we use? *Gray.*
Day 13, after another small rise in estrogen in her body, she notices similar mucus to what she experienced on day 9. What color? *Yellow.*
Days 14-19, she feels dry. *Gray.*
Day 20, she notices a crumbly mucus again. *Yellow.*
Day 21 she feels dry again. *Gray.*
Day 22 she notices something. *Yellow.*
After that, as you can see, progesterone remains the same and estrogen drops down. *What do you think she is feeling/seeing when there is no hormonal activity? Dry, charted as gray. Show the next slide with the completed chart and go over answers to clarify as needed.*

Step 5 (3 mins): CONCLUSION

You did a great job today! *Provide each student with their own printout of a FEMM chart.*You can take a FEMM chart home with you and try to chart your own cycle.

There are charting symbols and cervical mucus biomarkers on the back, for reference. Everyone will be at different stages of their cycle, so it's important to remember that charting is about **your** very own private health record. Charting helps you monitor what's happening with your hormones and your health. Throughout the next few lessons, we will be able to talk about what we can do to help keep our hormones and bodies healthy.

REFERENCES

teenFEMM Course Materials, Lessons 1-6

Vigil, P., Ceric, F., Cortés, M.E., & Klaus, H. (2006). Usefulness of monitoring fertility from menarche. *Journal of Pediatric Adolescent Gynaecology*, *19*(3), 173-9. https://doi.org/10.1016/j.jpag.2006.02.003

PURPOSE

To continue to teach students how to chart, with a focus on vital signs of reproductive health.
To teach students about the impact of nutrition, exercise, and sleep on hormones and health.

LEARNING OBJECTIVES

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

1. Understand how to chart and recognize healthy cycles
2. Identify the three pillars of health and recognize their impact on hormones.

MATERIALS & RESOURCES

- **Lesson 8.6 teenFEMM** powerpoint
- **Worksheet: *Addison's Chart***
- **Healthy Choices Case Studies** + Teacher's Answer Key
- **Journaling Exercise Challenge!**

VOCABULARY

- **Hormones:** Chemical signals that travel in the bloodstream, directing the activity of every system in the body.
- **Luteal Phase:** The part of the cycle that is after ovulation, but before menstruation.
- **Health Pillars:** Nutrition, exercise, and sleep are necessary to maintain good health.
- **Habit:** Something you do so often that it becomes natural for you.
- **Nutrition:** Foods that nourish the body, necessary for health and growth:
  - **Proteins:** build and maintain cells, help make hormones.
  - **Carbohydrates & fats:** provide energy, balance hormones.
  - **Vitamins & minerals:** build and maintain cells, balance hormones.
  - **Water:** carries nutrients, energizes muscle, clears waste.

PROCEDURE

Step 1 (5 minutes): *Introduce the lesson.*

What do you think about charting? Did you try to chart your cycle this past week? Does it help you to understand yourself or what's going on in your body? *Give students a minute to volunteer to share any of their responses to these questions.*

If you haven't started charting yet, or did but forgot for a few days and then had trouble getting

back to it, that's OK! The great thing is that you can always start at any point. If you've never paid attention to your biomarkers before, it can seem a little bit overwhelming. But maybe, if you start to chart, recognizing your own patterns will give you confidence in your body, realizing that what you had maybe previously thought was weird, random, or even something *bad*, is actually a sign of normal hormonal health biomarkers.

It can take a little bit of time to get used to it, and that is normal. It is like learning a new language - the language of your reproductive system's cycle!

In today's lesson, we will look at charting case studies and how important nutrition, exercise, and sleep habits are for your body.

Step 2 (10 minutes): *Introduce the case study for the day.*
Let's look at Addison.

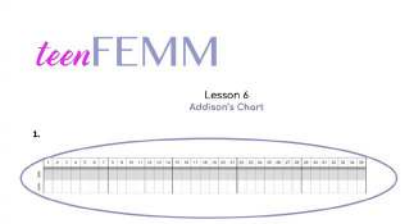
Addison is 13 years old and just started 8th grade. She has been charting for about 6 months. At first, her charts were much like the one we saw last lesson: some off and on cervical mucus which she charted as yellow. There were times when she wondered if it was even worth charting! She felt like nothing was changing.

Then about 2 months ago she started to notice a little bit more cervical fluid and began to chart some blue days. She remembered from her teenFEMM course that this indicated that her brain and ovaries must be communicating more and her hormonal axis was developing.

From her chart, we can actually get a picture of what is going on in her ovaries and how these hormones are acting on her cervix, producing different types of cervical mucus that she can observe. How cool is that?! Let's take a look.
It turns out that things were changing.

Because she was charting for the months leading up to her first period, she didn't feel so unprepared. *Handout the **Worksheet**: Addison's Chart to the class.*

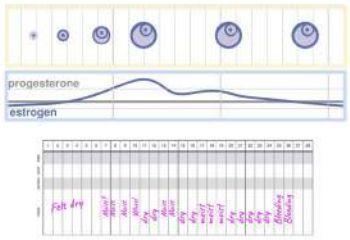
Worksheet



The first question on your worksheet is a blank chart. Let's see if we can help Addison fill in her chart, based on the slide information and Addison's notes.

Let's review the colors we will use on this chart. What is red for? That's right, red is for bleeding. How about yellow? That's right, yellow is for low estrogen. What about gray? Gray is progesterone and the feeling that accompanies this is dry. Now, we're getting a little more specific about blue today. Light blue is for rising estrogen and it has a moist sensation. Dark blue is for high estrogen and it has a slippery sensation. You might even see something clear or stretchy looking on the paper when you wipe when estrogen is high (it's not really blue in color, don't worry!)

Addison's cycle



On the first 6 days of her charting, Addison didn't "feel" any moisture when wiping and so she made a note that said, "felt dry". Looking at the activity in the ovary (top row) and also her hormonal chart, was Addison right? *Yes! There is very little happening in the ovary and estrogen is even lower than progesterone. Have students fill in the first six days of the chart in* ***gray.***

On day 7, Addison noticed a change to moisture. She said this felt different and looked different from the crumbly, pasty substance she noticed before, in earlier cycles. She had this for 3 days. What should she chart? ***Light blue*** *for rising estrogen.*

On day 10, Addison feels something very different. It's like a *slippery sensation:* Woop! *"Kind of cool that I can almost see what's going on inside of my body",* she writes in her notes. *It's more than just a little moisture. So, she charts* ***blue****.*

Then, the next day she feels dry. It's a very different feeling when wiping, compared to the day before. She c*harts **gray**. She has this again the next day. She charts **gray**.*

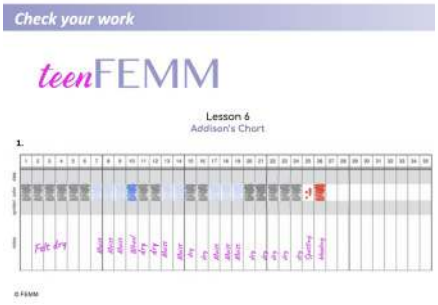
Then she feels some moisture again on days 13 and 14. It's not like it was on day 10, so she charts ***Light blue.***

Then she goes back to dry on 15 and 16. ***Gray.***

Some moisture again on days 17-19. **Light *blue***.
On day 20 it's dry. ***Gray.***
On days 21-24 it feels the same. *Dry.* ***Gray.***

Day 25 she notices some light spotting. She charts this as ***Red***. *On Day 26 she notices that her bleeding is heavier than the day before, and so she charts **Red*** again.

Have students compare their chart answers against the answers on the following slide:

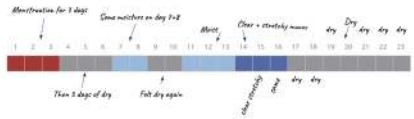


Let's check Addison's chart. Did she ovulate? *Not yet, but this is ok.* Her brain is sending messages to her ovaries to start to develop an egg, and as the egg grows, it is producing estrogen. That estrogen caused her cervix to produce the fluid that she noticed and charted as light blue for rising estrogen. This is exciting, because these increased levels of hormones are contributing to Addison's growth and development, even if her cycles aren't mature yet.

Step 2 (10 minutes): *Complete Worksheet*

The second question on your worksheet shows us Addison's chart a few months later.

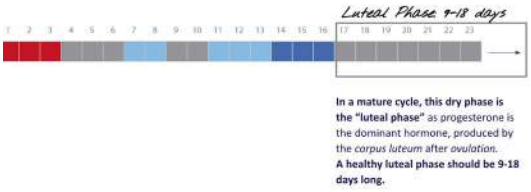
Worksheet



We see that Addison had her period (menstruation) for 3 days. Then "dry" for 3 days. She charted "some moisture" on days 7 and 8 with *light blue*, for a slight rise in estrogen. Then dry on days 9 and 10. On days 11-13 she noticed moisture again, charted it as *light blue*, and then on days 14-16 she noticed a small amount of clear, stretchy, slippery cervical fluid and so she charted this biomarker *blue*. On day 17, she felt dry again and so she charted this as gray. She charted dry for several days, until the last day of her cycle on day 23.

Do you think Addison ovulated this cycle?

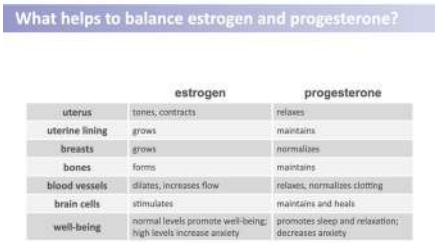
Answer: *Addison's cycle is still maturing*



Addison did not ovulate, but she is definitely getting close! It may be that her next cycle is an ovulatory one. Maybe you're thinking, *"how do we know Addison didn't ovulate … when her chart looks like she did?"* Good question!

In Addison's first few cycles, dryness indicated that she was experiencing very little hormonal activity (low progesterone AND estrogen) - remember the chart that was just yellow and gray? When the cycle is mature, **this dry phase is called the "luteal phase"** as progesterone is the dominant hormone, produced by the **corpus luteum** after ovulation, remember? However, in an ovulatory cycle, the luteal phase should be 9-18 days long. In the case of Addison's chart, she doesn't yet have a "luteal phase" (hers is fewer than 9 days) which is why we think ovulation didn't take place (no ovulation, no corpus luteum formed). But, for Addison's age this chart is totally normal and healthy! As Addison's cycles get more regular, she'll have more dry days at the end of her cycle.

We have learned that it's important to have both estrogen and progesterone balance each other out. So, why does it seem like it's "all about estrogen"? As we can see from this slide: it's because estrogen proliferates! That means to "grow rapidly".



So, during puberty, estrogen is the one kickstarting all of that rapid growth happening in your body. Estrogen is critical to forming the neural pathways in your brain, which means it **impacts how you think as you grow!** But as you can see from the chart, you want progesterone, too.
Question: Is there anything that you can do to help balance your hormones? Yes!

Step 5 (10 minutes): *the 3 Health Pillars*

Nutrition is the nourishment that your body gets from the food you eat. Good nutrition supports a healthy body, especially as your brain and hormones are developing through puberty. You're creating the habits and neural pathways that will be with you for life. What we eat, our body breaks down and uses to try and provide the nutrients our bones and muscles and cells need. Let's say you're eating french fries for lunch most days – you're not giving your body much to work with in terms of nutrients!

Keeping nutrition simple:

Proteins: build and maintain cells, help make hormones.

Ask students to give three examples of sources of protein: red meat, chicken, fish, eggs and yogurt.

Carbohydrates & fats: provide energy, balance hormones.

Ask students to give three examples of ***carbohydrates:*** *pasta, oats, whole grain bread and potatoes.*

Ask students to give three examples of healthy fats: avocado, olive oil, nuts and seeds, as well as peanut or nut butters.

Vitamins & minerals: build and maintain cells, balance hormones.
Ask students to give three examples of foods rich in vitamins. Think "eat the rainbow": oranges and grapefruit, blueberries, blackberries, green leafy vegetables, etc.

Water: carries nutrients, energizes muscle, clears waste.

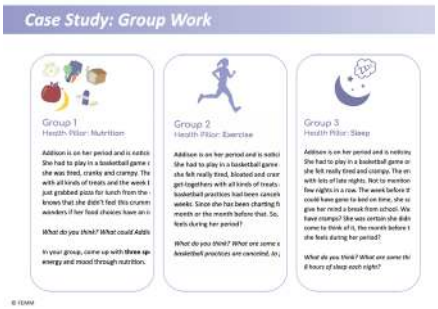
Exercise is also important for a healthy body and mind. It strengthens your heart, lungs, muscles and bones. It increases your energy, improves your mood, and reduces anxiety. Exercise releases hormones that make you feel happier, more confident, and less stressed! Have you ever felt an emotional boost after exercising?

Exercise can be "you" time, simply taking a walk and listening to music. Or, bring a friend along and talk. Whatever kind of exercise you like, whether it's playing sports, jogging, walking, dancing or swimming, the important thing is to get moving for at least 30 and ideally 60 minutes each day.

Sleep is absolutely essential to overall health. As we sleep, our bodies are able to grow and repair. D*id you know that every part of your body is renewed faster during sleep than when awake?* Most of your reproductive hormones are produced while you sleep!

In order for your body to repair itself at the end of each day, you need 8-10 hours of sleep at night! This helps your body build and repair your bones and muscles, regulate your growth hormones and keep your immune system strong. 8-10 hours of sleep will keep your mind sharp, your mood positive, and your weight healthy. *How much sleep do you get? What makes it hard for you to get enough sleep? Opportunity to discuss.*

Step 6 (10 min): *Case Study Worksheet*
Divide students into 3 groups and give each group a Health Pillar Case Study to work on.


Case Study: Group Work

Group 1
Health Pillar: Nutrition

Group 2
Health Pillar: Exercise

Group 3
Health Pillar: Sleep

Give each group a few minutes to read their case study and write down three recommendations. Then, have each group briefly present their three recommendations to the class. Discuss and provide feedback as necessary, using the ***Teacher's Answer Key****.*

CONCLUSION (5 minutes)

In this lesson, we learned more about charting and how to observe your signs in early cycles. We talked about the 3 pillars of health: nutrition, sleep and exercise, and how each of these pillars impact your mood, energy and hormones.

For **HOMEWORK**, give students the ***Journaling Exercise Challenge!*** *Encourage students to try to undertake the five-day Exercise Challenge together as a class. Or, try a students versus teachers challenge to try and see how many days-in-a-row can be achieved.*

REFERENCES

Klump, K.L., Keel, P.K., Sisk, C., & Burt, S.A. (2010). Preliminary evidence that estradiol moderates genetic influences on disordered eating attitudes and behaviors during puberty. *Psychological Medicine, 40*, 1745–53. https://10.1017/S0033291709992236

Vigil, P., Ceric, F., Cortés, M.E., & Klaus, H. (2006). Usefulness of monitoring fertility from menarche. *Journal of Pediatric Adolescent Gynaecology*, *19*(3), 173-9. https://doi.org/10.1016/j.jpag.2006.02.003

Vigil, P., Meléndez, J. & Petkovic, G. & del Rio, J. (2022). The importance of estradiol for body weight regulation in women. *Frontiers in Endocrinology*, 13, https://doi.org/10.3389/fendo.2022.951186

PURPOSE

To continue to support students in charting their health. To emphasize the important impact of adequate nutrition, sleep, and exercise on health.

LEARNING OBJECTIVES

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

1. Chart their cycles, recognizing that it can be normal if they have not yet reached an ovulatory cycle.
2. Understand the importance of exercise for their body.
3. Recognize what is normal and healthy for their body.

MATERIALS & RESOURCES

- **Lesson 7 teenFEMM** powerpoint
- **"Entry Ticket" Exercise** *(requires some preparation before class)*
- **Worksheet: Sienna's Health + Cycle Chart** *(students will need pencil crayons)*
- **Healthy Body Quiz** + Answer Key
- **Social Media + Self Awareness Challenge!**

VOCABULARY

- **Habit:** something you do so often that it becomes natural to you.
- **Health Pillars:** nutrition, exercise, and sleep are necessary to maintain good health.
    - **Nutrition:** foods that nourish the body, necessary for health and growth:

      Proteins: build and maintain cells, help make hormones.
      Carbohydrates & fats: provide energy, balance hormones.
      Vitamins & minerals: build and maintain cells, balance hormones.
      Water: carries nutrients, energizes muscle, clears waste.
    - **Exercise:** physical activity to improve overall health (30-60 min/day)
    - **Sleep:** when the body renews and repairs itself (need 8-10 hrs/night)

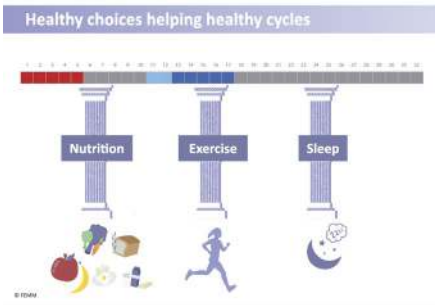
PROCEDURE

Step 1 (5 minutes)*: Entry Ticket Activity*

Hand out a ticket to each student as they enter the classroom. Instruct students to write down their responses on the ticket. Then, have students share their responses with the class!

Step 2 (5 minutes)*: Review the Exercise Challenge*

Last lesson, we talked about how charting can help you to "see" on paper what is going on with your hormones inside your body.



This can help you to know which hormone is the dominant hormone at the time, and then to connect different feelings and emotions with which part of your cycle you are in. Have you noticed any connections with your nutrition, physical activity, sleep and how you felt emotionally or physically? How was the ***Journal Exercise Challenge?*** *Was it hard or easy? What were some of the obstacles you faced in trying to complete the challenge? Give students a few minutes to share any reflections or comments.*

It's important to change our mindset when it comes to exercise. Exercise is not just for athletes and it's not about being a certain body type or weight.

Exercise is simply about doing what your body and mind need to be healthy.

Exercise is for your heart, lungs, muscles and bones. It increases your energy, improves your mood and reduces anxiety. ***How does exercise improve your mood?*** Exercise releases endorphins, which are chemical signals from the brain (in the pituitary gland) that increase feelings of wellbeing. As we know, hormones are all chemical messengers. The job of these hormones is to make you feel happier, more confident, and less stressed! So physical activity literally exercises the hormones in your brain! Last but not least, physical activity improves your circulation which helps, well, everything!

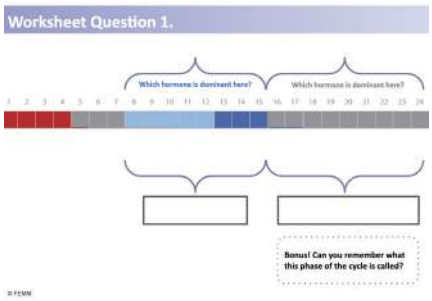
Step 3: (10 mins) *Worksheet: Sienna's Health + Cycle Chart*

Let's look at the healthy cycle of another 8th grade girl named Sienna who is friends with Addison. Let's see what we know about Sienna.

Handout the Worksheet ***Sienna's Health + Cycle Chart*** *for each student in the class. Answers to the Worksheet Questions are provided in the slides.*

Sienna is on the cross country team and her family has a dog, a black lab named Riley. She is not ovulating yet, but she has been charting for 6 months. As you can see from her chart, Sienna's **hormonal axis** is continuing to wake up and she is, like Addison, getting closer to having an ovulatory cycle. Let's take a couple of minutes to fill in the answers to Question 1. on your worksheet. *Questions can be displayed and read aloud*

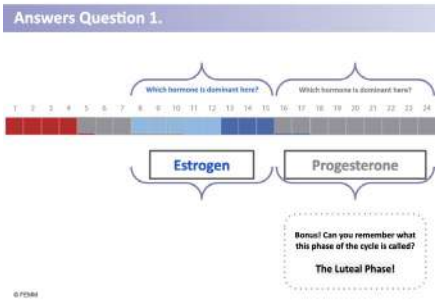
from the slide.



Once students have answered the questions individually on their worksheet, go through the answers, together.

Sienna's period lasted four days. Then her brain sent Follicle Stimulating Hormone to the ovaries to begin to develop an egg. As that egg started to develop, it produced….? That's right, *estrogen.* This is where we see the *light blue on day 8* on Sienna's chart. Light blue for rising estrogen and blue for high estrogen. "**Which hormone is dominant during this part of the cycle?" Estrogen!**

Even though the egg grew, and produced estrogen which is great for Sienna's growth and development, it didn't mature enough to trigger LH and Sienna didn't ovulate. Progesterone took over after the egg stopped progressing towards ovulation (this is why she experienced dryness). "**Which hormone is dominant during this part of the cycle?" Progesterone!**
***Bonus:* this phase of the cycle is called the *luteal phase*.**



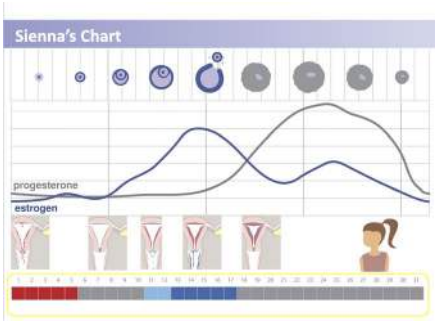
Step 4: (10 minutes) *Mature Ovulatory Cycles*

A few months later, Sienna began to take notice of the link between the types of food she was eating and how she felt during her period. She tried to eat less candy, especially before her period. From this, she noticed less cramping and overall tiredness during her period. The next cycle, Sienna also noticed that if she prioritized sleep in the week before her period, she was less worn out during her period. It was exciting for her to notice these correlations and be able to see how changing her habits really helped her to be more self-aware and feel better about herself.

About 6 months later, Sienna noticed her cycles getting longer and longer. Question number two on your worksheet is a blank chart, so we'll help Sienna fill in her chart. *Have students use their pencil crayons to fill in the chart for Sienna's cycle.*

Day 1- Sienna had moderate bleeding, day 2- heavy bleeding, day 3- medium bleeding, day 4- light bleeding, day 5- light bleeding. Days 6-10- dry, day 11- she felt a change to moisture, day 12- that moisture continued, day 13 she felt wetness and noticed some clear mucus, days 14-15 same, day 16- she saw more of the clear mucus, day 17- she noticed clear, stretchy, slippery mucus, days 18-31- she felt dry.

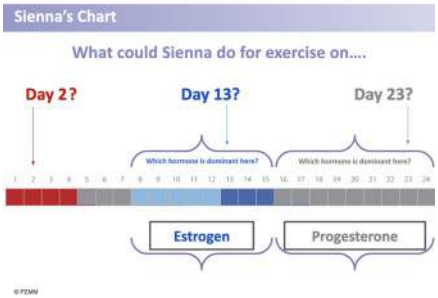
CLICK TO REVEAL THE CHARTING. *Have students check their chart answers with the following slide:*



Do you remember how long the luteal phase should be in a mature ovulatory cycle? 9-18 days. How long is Sienna's luteal phase? 14 days. Sienna's chart shows a very normal and healthy *ovulatory cycle*.

Now, based on Sienna's chart, what kind of exercise would you recommend for Sienna on the following days of her cycle: Day 2, Day 13 and Day 23?

Give students a couple of minutes to write down their answers to question #3 on their worksheet. Then, ask students to share their responses before offering the following suggestions.



Day 2: Exercise that is low impact: walking, stretching, etc. When her period is over, she may have more energy and be more interested in cardio (jogging) or higher energy activities.
Day 13: Exercise that is high energy output: cardio of all types, HIIT workouts, sports, swimming, biking, taking Riley for a run, etc.
Day 23: Exercise that is lower in energy output: pilates, stretching, weight training.

Step 5: (10 minutes): *Normal + Healthy Cycles*

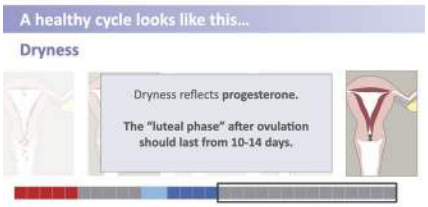
Now that we have journeyed first with Addison and now Sienna as they charted the healthy progression of their cycle from first period to an ovulatory cycle, you might be wondering how to know if a cycle is healthy, and if every girl's chart will look the same?

There is a healthy range of normal for mature cycles. A healthy cycle looks like…

Day 1 of each cycle starts on the first day of your period or menstruation; this will be lighter now, but last a little bit longer and be a little bit heavier as you begin to ovulate. A healthy menstruation should be 3-7 days.

Then, some girls experience dryness before the onset of mucus. The number of days of dryness can be different for each woman. Some might have a day or two, others might notice mucus right away after bleeding slows. Totally normal.

If you are ovulating and your cycles become regular, you will notice the first day that you see and/or sense mucus that will increase in quantity and quality (become more stretchy, clear, and slippery). Then, ovulation will occur.



After ovulation, it is normal to experience dryness, because the empty follicle (which contained the egg as it developed) turns into the corpus luteum and produces progesterone.

Step 6 (5 minutes): *Healthy Body Quiz*

Handout the Healthy Body Quiz to students. Give students two minutes to complete the 10 True or False questions. After the two minutes is up, review whether the statement is "True" or "False", using the Teacher's Answer Key provided in the materials.

Provide students with a copy of the Answer Key to read and take home for their reference.

Step 7: *Conclusion + Social Media Homework*

Now you've seen an example of a healthy, ovulatory cycle. As you continue to chart, you can pay attention to your nutrition, the type of physical movement and exercise you do, how much sleep you get, and try to notice how these relate to how you feel, both emotionally and physically, at different parts of your cycle. Maintaining a healthy lifestyle and forming positive habits will support your health, allowing you to grow into the person that you are meant to be!

*For **HOMEWORK**, assign students the **Social Media + Self Awareness Challenge.** Encourage students to simply observe their social media habits for a week and answer the questions and journaling prompts each day.*

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PURPOSE

To further explore the connection between hormones and emotions. To recognize the importance of maintaining a positive body image and healthy relationships.

LEARNING OBJECTIVES

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

1. Understand the impact of certain hormones on the brain and their relationship to how we feel.
2. Understand what might be influencing our emotions (hormones, peers, social media) at this stage in our development.
3. To continue to chart biomarkers and think about emotional changes throughout the cycle.
4. To use charting as a tool to understand themselves and how they feel in order to increase confidence and maintain healthy relationships.

MATERIALS & RESOURCES

- **Entry Ticket Activity: Insta teenFEMM** (preparation needed)
- **Lesson 8 teenFEMM** powerpoint
- Worksheet: **Harper's Chart** + Teacher's Answer Key
- **Case Study**
- Worksheet: **When I Feel Stressed, I…**

VOCABULARY

- **Hormones:** Chemical signals that travel in the bloodstream, directing the activity of every system in the body.
- **Self Awareness**: having a strong understanding of who you are, how you think and feel, and the reasons for your actions.
- **Social media:** websites and applications that enable users to create and share content or to participate in social networking.
- **Habit:** something you do so often that it becomes natural to you.

- **Body image:** how an individual person sees their own body and the feelings that go along with this perception, both positive and negative.
- **Health Pillars:** Nutrition, exercise, and sleep are three essentials in maintaining good health.
- **Stress:** The body's response to physical, mental, or emotional pressure.

    - **Internal stressor:** Thoughts or behaviors that create stress.
    - **External stressor:** Stressors that come from external factors that you cannot control.

PROCEDURE

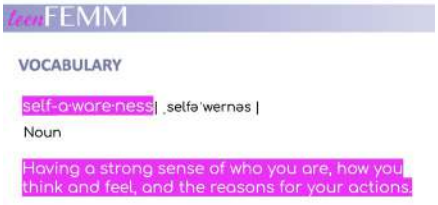
Step 1 (5 minutes): Entry Ticket activity. *As students enter the class, give each student an **Insta teenFEMM** image. Instruct students to draw a self-portrait in their Insta teenFEMM frame, keeping their pen/pencil on the paper for the duration of the portrait to create a "continuous line" drawing.*

Once students have completed their Insta self portrait, collect the drawings from the class and hang them up in the classroom. Ask: What was fun about making your drawing? How did you try to capture certain features or accessories, like hair style or glasses, clothing, etc.?

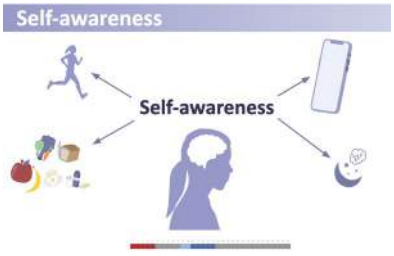
Ask:Is your drawing perfect? Help students to reflect on the fact that "perfection" wasn't really the point of the exercise, and each drawing is supposed to look just as it does! Now, think about how hard on ourselves we can be, how much we scrutinize our body parts, our facial features, our skin… and why? To try to achieve some kind of idea of "perfection". But, no human person is or can be perfect. So, what if we spent our time

focusing on more important things, like becoming someone who is… kind, sincere, artistic, creative, funny, knows how to play an instrument, makes others feel welcome, takes care of others, is generous with their time and gifts, shows respect to their parents and teachers, has an impressive work ethic, acts with integrity, etc. *Give students a chance to discuss, sharing their ideas and reflections.*

Step 2 (5 minutes): *Introduce the concept of self awareness.*



What is **self awareness?** Self awareness means to have a better understanding of who you are, and how you think, feel, and act. Being more aware of yourself, your emotions, and your thoughts. Part of self-awareness is understanding how your hormones, exercise, nutrition, sleep and even the media you are consuming all affect your mood and health.

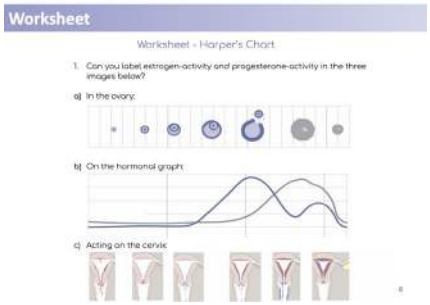


Developing self-awareness through charting can help you to feel more confident. It can help you decide when and how to communicate your thoughts and to resolve conflicts with important people in your life. If you are able to recognize how you feel and why, it can help you relate to others. Being self-aware makes you a more thoughtful friend, sibling, daughter, classmate, and teammate. As you continue to chart your cycle each day, this habit of self-awareness will help you understand how and why you feel the way you do throughout the month.

Step 3 (5 mins): *Worksheet: Harper's Chart*

Let's look at these concepts on a more practical level, and see how you can apply them. In order to do this, we will look at the chart for another girl in Sienna and Addison's class, named Harper.

Hand out the Worksheet: Harper's Chart to students. Give students a couple of minutes to answer the questions. Then, review the answers together as a class, using the Teacher's Answer Key.



What biomarker is associated with increasing estrogen? *Cervical fluid*. What color will Harper chart? *Blue.* What biomarker will Harper most likely experience at the end of her cycle when progesterone is the dominant hormone? *Dryness.* What color will she chart? *Gray.*

At the end of a cycle, when both estrogen and progesterone are dropping before the next cycle, emotional changes are common as hormones fall. It is normal to feel a little bit more down at the end of your cycle when your hormones are dropping. It is normal to have slightly less energy and feel more irritable or less social.

Step 4 (10 mins): Case Study

Now that Harper is charting her cycle, she is trying to become more aware of the

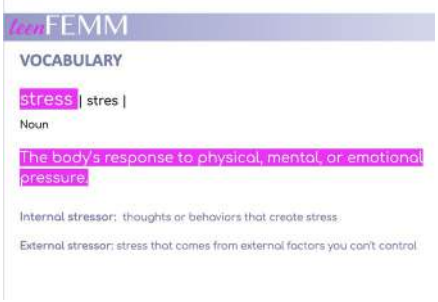
emotional changes she experiences. Let's look at a situation that happened this week and see if we can help Harper work through her feelings and reactions.
*Read the **Case Study** aloud to the class. Then, discuss and answer the three questions associated with the text:*

1. Why do you think Harper may have been more impatient with her brother than normal?
Possible answers: she was stressed about her test and about school, she was feeling down on herself because of needing a tutor, she was comparing her current life to an idealized representation of the lives of others on social media, she was possibly near the end of her cycle when her hormones already would have made her feel down, without the other stressors!

2. What could she have done differently in this situation?
Possible answers: Harper could have put her phone away and gone to talk to her Mom or a trusted adult about her math test and how she was frustrated about needing a tutor. Even talking through her emotions and thoughts would have made her feel better and calmed her down. She could have gone for a walk to clear her head and get some fresh air and endorphins (those feel good hormones) to reset after a stressful day.

3. How could Harper have better handled the situation?
Possible answer: Harper could have just recognized her brother was being extra silly with a friend over and therefore chosen to leave them alone, talk to a trusted adult, or gone for a walk and listened to some music before returning to tackle her chores list (away from her brother and his friend).

Harper was stressed. That's normal. Stress is the body's natural response to physical, mental or emotional pressure.



In the Case Study on Harper that we just looked at, what would be an example of an *internal stressor?* An *external stressor?*

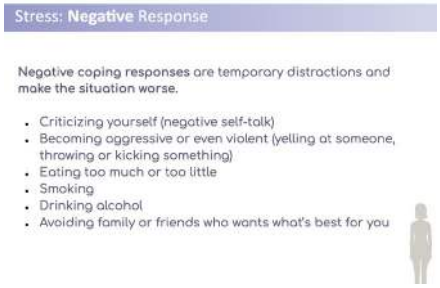
Internal stressor: *"...no one else she knew seemed to have to go to a tutor or do extra work. She was the only stupid one… Nobody else had to do chores…"* These are all examples of Harper's internal stressors: her thoughts and behaviors that are causing stress. These thoughts are untrue (other people do have to do chores… everyone needs help with something… it's mature to accept support and do extra work to get good grades). As she continues to think these thoughts, she feels worse about her life, causing her more stress.

External stressor: "*She had a tough math test at school that day… all of her friends thought it was easy… the teacher told her she should consider getting some extra tutoring support… Camden started running through the kitchen with his friend being so loud and telling the stupidest jokes!" These are all examples of external stressors that Harper is experiencing.*

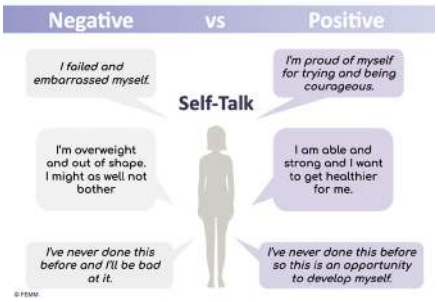
Step 5 (10 mins): Stress responses; ***Worksheet: When I Feel Stressed, I…***

As a teenager, stress can be as a result of grades, sports, siblings or peers. As adults, stress might be about finances, a job, taking care of a family, etc. Stress happens. But what really makes us mature is how we practice dealing with it.

There are internal and external stressors and there are positive and negative ways to respond to both. *With the following slide, identify negative ways to respond to stress:*



Negative responses to stress, like negative self-talk and criticism, may be a common response, but it actually makes the stress and the situation worse. Try to talk to yourself the way you would talk to a friend. If your friend ran for student council and lost, you wouldn't say "it's because you're a loser and no one actually likes you." You'd say that you admire them for running and they should try again next year since the teachers said the race was really close!



Positive responses to stress acknowledge the situation might be difficult, but develop habits of **resilience** which help us for life. *With the following slide, go over examples of positive ways to respond to stress:*

*Hand out the **Worksheet: When I Feel Stressed, I…** Give students a few minutes to reflect and write down their responses. Once all of the students have finished, ask for volunteers to share any of their responses.*

Step 6 (5 mins): *Stress and Social Media Journal*

*Discuss with students their **Social Media Journal** Challenge from the previous class.*

Ask: What did anyone notice about their mood after scrolling through social media? In general, do you feel more or less confident in your choices, abilities, and interests after being on social media? Do you have more positive or negative feelings about the way you see your body? Do you feel more or less grateful for the things you have in your life?

Taking the time to do an emotional check in can help you to become more aware of how social media affects you and your self-image. This is a very normal time in your life to be thinking more about your body as it grows and changes. But, every person grows at their own pace, depending on genetics and healthy choices. It is so important not to spend a lot of time comparing ourselves to girls and women online. Even Instagram admits that using the app causes young girls to change how they view themselves, admitting its 'toxic' effect on teen girls".

If you are charting your cycle, making good choices when it comes to nutrition, exercise, and sleep, then you will grow and develop at the pace that is right for you! If you have questions or want to talk about your experience, ask a trusted parent or family member in your life about their experiences instead of comparing yourself to what you see on instagram, Tik Tok, etc. Take some time to think about how images on social media make you feel about you and your body. Then, compare those feelings to the facts you have learned about what it means to be healthy. When in doubt - (feeling moody, confused, anxious…) turn your phone off and go outside for a walk. You'll clear your head and move your body, which feels good.

CONCLUSION (5 mins): *Summary*

The boys in your grade have completed their grade 8 teenMEN course as you have been working through this course. Although their changes are different from yours, many of

the same hormones are also playing a major role in the boys' body and brain development during puberty. It is important to remember that all kids go through puberty. It's helpful to have a little bit more understanding for each other as you navigate these changes.

This brings us to the end of our teenFEMM grade 8 course. I hope that you have learned some new things about your cycle and your health, and are feeling excited to be going through this amazing stage of growth in your lives. It is a great idea to keep charting- on paper or in the free FEMM App online if your parents are ok with it - so that you have a unique health record for yourself as you become the woman you are meant to be. Remember the impacts of sleep, nutrition, and exercise on your developing mind and body, and that your ovulation cycle is an amazing window into your own health and strength as a young woman! As you become more aware of these hormonal changes and how they impact how you think and feel, you will be better equipped to face all of the exciting new adventures life has in store for you.

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