

PURPOSE

To develop students' knowledge that the ovulatory cycle is a positive sign of health and that estrogen and progesterone impact the health of the whole body.

LEARNING OBJECTIVES

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

1. Understand the female body has a regularly occurring cycle.
2. Understand the basic functioning of the cycle, including menstruation.
3. Understand the effect hormones have on the development of the female brain and body.

MATERIALS & RESOURCES

- Lesson 4 teenFEMM powerpoint
- Activity: Cycle Sequence (scissors and tape required)

VOCABULARY

- **Hormones:** Chemical signals that travel in the bloodstream, directing the activity of every system in the body.
- **Female 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 to develop a growing baby; in men, to produce sperm (the male cell of reproduction).
- **Ovulation:** When a mature egg is released from the ovary. In women, ovulation is an important 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 - the ovulation 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.')

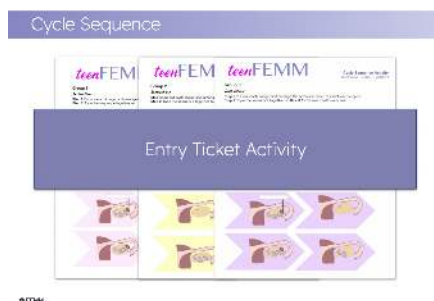
- **Zygote:** a fertilized egg.
- **Implantation:** When a fertilized egg attaches to the uterine lining

PREPARATION

- ☐ Print all four pages of the **Activity: Cycle Sequence**. Each group will also require scissors and tape.

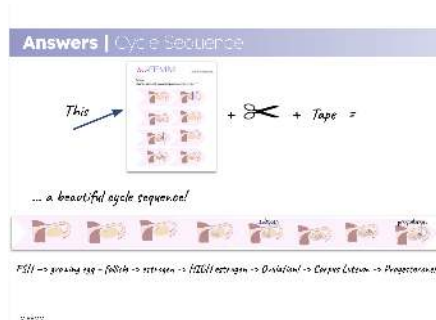
PROCEDURE

Step 1 (5 minutes): **Activity: Cycle Sequence**



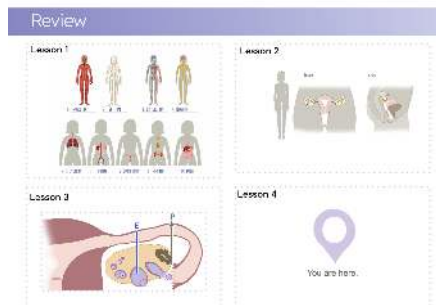
Instructions:

1. Divide students into three groups. Give each group one of the Cycle Sequence Activity sheets, along with a pair of scissors and tape. *Put the final page aside until later in the lesson.*
2. Instruct students to cut out each arrow puzzle piece (8 per sheet) and then arrange them in a row, according to the order of events of the ovulatory cycle. Groups must also label the two main female hormones produced in the ovary.
3. Each group must have the teacher check their sequence and make any changes as needed, before taping the sequence together. *The first group to correctly complete their cycle sequence wins!*



For now, set aside the cycle sequences for students to return to later.

Step 2 (5 minutes): Review previous lessons and introduce new concepts for this lesson



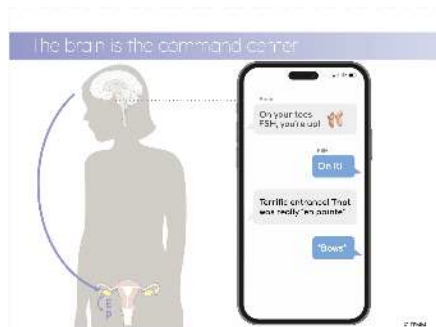
In lesson one we learned about 9 of the body's systems and how they work together. In lesson two, we zoomed in on your reproductive system and its anatomy and function. In lesson three, we looked closely at the ovaries and the process of ovulation. Today, we will talk about the rest of the ovulatory cycle and menstruation.

Do you remember what controls the activity of every system in the body?

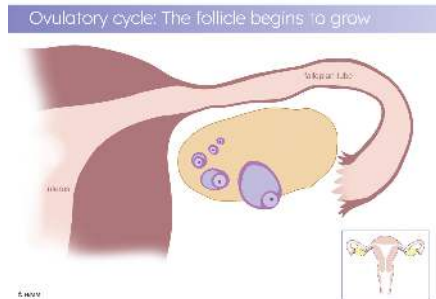
Yes, *hormones!* Hormones aren't random: every single hormone is released and directed by your brain. For you to feel good and healthy in your body, every hormone needs to be released at the correct level and at the correct time. One way to think about the cycle each month is that your hormones go through an intricate sort of dance and the brain is the choreographer: *"On your toes FSH, you're up! Now rise, Estrogen... gradually..."*

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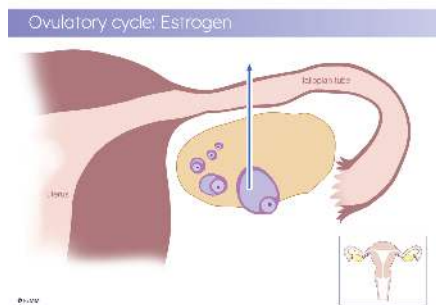
Healthy Hormonal Cycle teenFEMM – Grade 7 | Lesson 4



Remember the hormonal axis: the brain is the command center but it's in constant communication with the ovaries. Let's briefly review the ovulatory cycle as a class.

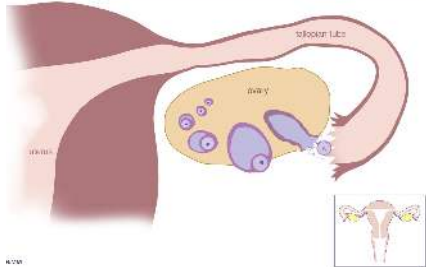


Every month, in the ovary, an egg, a female cell of reproduction, begins to grow and develop. This egg is surrounded by a special, protective tissue, called a: follicle. The egg and follicle grow: together.



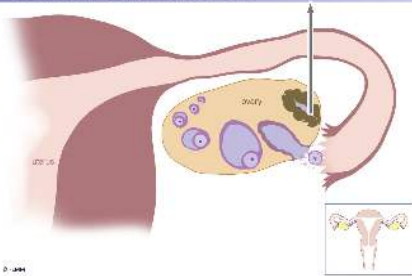
As the egg and follicle grow in size, they produce more and more of the hormone: estrogen. When the egg is big enough, the egg bursts from its follicle and leaves the ovary. This is called: ovulation.

Ovulatory cycle: Ovulation



After ovulation, the now-empty follicle becomes a new tissue that produces the second main female hormone: progesterone. This new tissue that produces progesterone is called the corpus luteum which in Latin means “yellow body”.

Ovulatory Cycle: Progesterone



What are the 2 jobs of the ovaries? *Click on the yellow box to reveal each answer.*

Check your knowledge!

What are the 🍷 jobs
of the ovaries?

- 1
- 2

Check your knowledge!

What are the 🍷 jobs
of the ovaries?

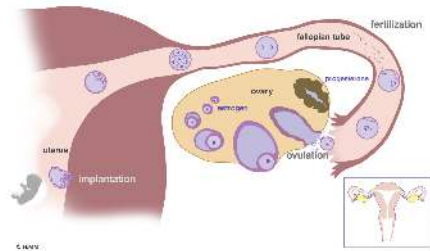
- 1 To grow and release an egg 🥚
- 2 Produce estrogen ↑ + progesterone ↑

1. To grow and release an egg (ovulation).
2. To make the hormones estrogen and progesterone.

Step 3 (10 minutes): *Expand on the rest of the cycle*

What happens to the egg after it is released from the ovary into the fallopian tube?

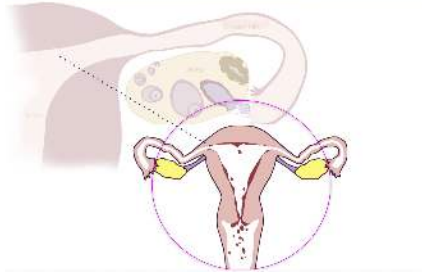
The beginning of life



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 contains the genetic material from both the woman's egg and the man's sperm: 23 chromosomes from the female cell and the 23 chromosomes from the male cell.

As the fertilized egg, or zygote travels from the fallopian tube to the uterus, hour after hour it divides from one cell into two and then four, until (while still only the size of a pinhead!) Eventually, this new life is composed of hundreds of cells when it embeds into the uterine wall. There it continues to grow and expand the uterus until approximately 9 months later.

Menstruation



On its own, the egg simply dissolves after 12-24 hours (just like the grains of salt in the water did that we observed last class). Days later, the uterine lining sheds during a few days of bleeding at the end of the cycle. This shedding of the uterine lining is called **menstruation** and it is what is happening inside of you when you get your period.

Menstruation typically lasts from 3-7 days.

As we have learned, the growing egg/follicle in the ovary makes estrogen. The **estrogen** produced in the ovary impacts the **uterus** by thickening the lining of the uterus. The **progesterone** produced in the ovary acts on the **uterus** by nourishing and maintaining the lining of the uterus, in case a baby attaches and grows.

The whole ovulatory cycle: from growing and releasing an egg, producing the hormone estrogen and then progesterone, to menstruation, repeats every 24-36 days. This cycle is a normal and important process that tells us a lot about a woman's health and the health of her hormones.

Step 4 (5 minutes): *Link the ovulatory cycle + menstruation*

*Cut out the three arrows on the last page of the **Cycle Sequence** Activity.*



Now that we've learned that menstruation (the shedding of the uterine lining) marks the end of the ovulatory cycle (like a period comes at the end of a sentence), let's place the final piece at the end of each cycle sequence. *Have students tape the menstruation image to the end of each cycle sequence. Then, connect and tape all three sequences together in a long line. Finally, tape both ends together to make one large circle/loop.*



The large loop illustrates how the end of each cycle begins the next. This visual representation will hopefully be helpful as we learn to chart in upcoming lessons.

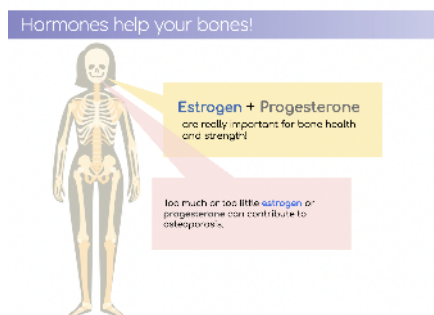
Step 5 (10 minutes): *Estrogen, Progesterone and overall health*

To better understand why ovulation is a sign of health, let's look at the effects of estrogen and progesterone on different parts of the body.

Effects of estrogen & progesterone		
	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 builds
well-being	normal levels promote well-being; high levels increase anxiety	promotes sleep and relaxation; decreases anxiety

Bones (height/size and density)

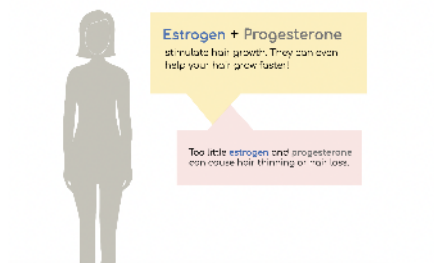
Throughout puberty, your bones are growing rapidly. By the time you have a regular cycle, you will most likely have reached your adult height. This is why hormonal health is so important during puberty, as your body's estrogen and progesterone levels influence your height and the health of your bones. Proper hormone levels are vital to achieve strong bones so that they are not as susceptible to breaks.



Hair/Sweat

As estrogen starts to increase in the ovaries during puberty, the impact of this can be seen in the hair. You may find that your hair gets more oily, thick or even changes texture: some people with straight hair start having wavy hair during puberty and vice versa.

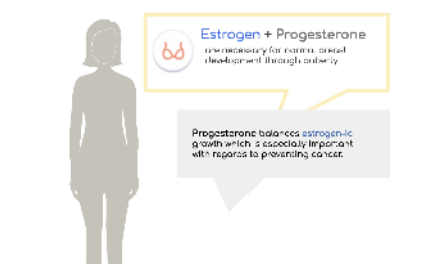
Hormones help your hair!



You will also notice the growth of pubic and underarm hair. You may also find that you sweat more, and are ready to use deodorant. Deodorant is usually applied under the arms once in the morning and reapplied if you have a sporting event or another activity that might cause more sweating later in the day.

Breasts

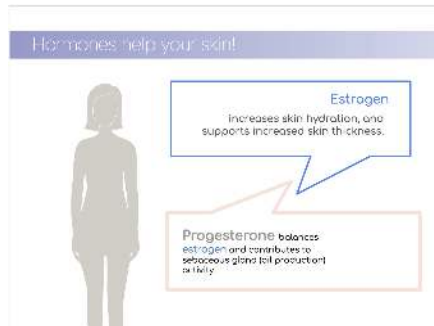
Hormones help healthy breasts



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. Don't worry, it is common for one breast to grow faster than the other.

Skin

Hormones are working hard in your body throughout puberty. Sometimes when they work a little too hard, you can end up with breakouts or acne, which is when there is an overproduction of oil in the glands in your skin.

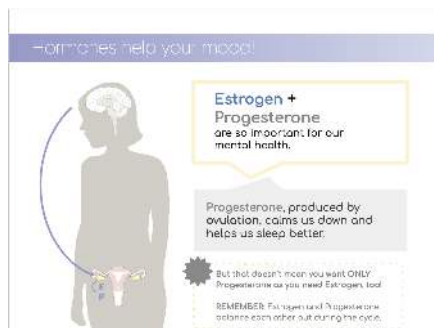


Making healthy choices to support overall hormonal balance can help to keep your skin smooth and clear into the future. We will talk more about this in other lessons.

Mood



It is very common to experience mood changes as you go through puberty. After all, we have learned a lot about how much hormones influence your brain! Even minor drops in estrogen can make us feel irritable or anxious. Ovulation is a sign of health for our body but also for our mental health as estrogen boosts mood.



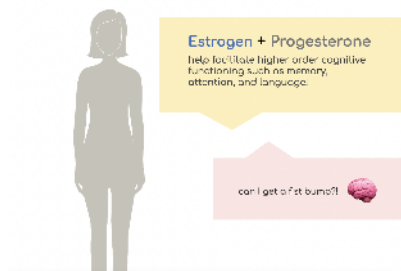
Progesterone, which is produced after ovulation, calms us down and can help us sleep better. But you don't want only progesterone as you need estrogen, too! Remember:

estrogen and progesterone balance each other out, through the different points in the cycle.

Brain

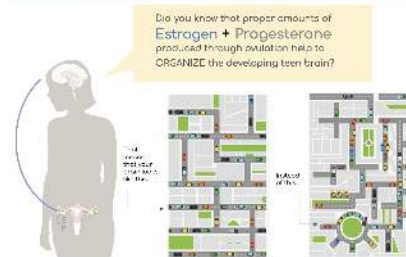
Did you know that the male and female brain is not fully mature until age 25? Hormones play a key role in helping all of the essential brain pathways and processes to develop and connect properly.

Hormones help our brain!



Hormones influence how structures of the brain grow and what parts of it are activated in certain situations or environments.

Hormones organize your brain.



All of this can be a lot to take in. Is there a trusted adult you can talk to about your questions? Maybe they can help you with a personal care routine? For instance, you may feel more confident if you are prepared ahead of time for your period.

CONCLUSION

Now that we've learned more about the ovulatory cycle, menstruation and how the hormones progesterone and estrogen develop our bodies and brain, next lesson we will learn how to record specific characteristics of our cycle in order to pay attention to the quality of our hormones 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>