

PURPOSE

To develop students' knowledge of the process of ovulation and the production of reproductive hormones.

LEARNING OBJECTIVES

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

1. Understand the basic process of ovulation.
2. Understand that the ovary produces estrogen and progesterone.
3. Understand that hormonal health is important for their development throughout puberty and beyond.

MATERIALS & RESOURCES

- Lesson 3 teenFEMM powerpoint
- Entry Ticket Activity: #knowthyselfie
- Worksheet: Five Points

VOCABULARY

- **Female Reproductive System:** The group of organs in the lower belly/pelvis that work together to mature an egg (the female cell of reproduction) and to develop a growing baby.
- **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.
- **Ovulation:** When a mature egg is released from the ovary.
- **Egg:** The female cell of reproduction, stored in the ovaries.
- **Follicle:** The tissue that surrounds an egg as it matures in the ovary.

- **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.
- **Estrogen:** The hormone produced by the growing egg/follicle.
- **Progesterone:** The hormone produced, after ovulation, by the changed follicle/new tissue.
- **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.

PREPARATION

- ☐ Print the **Entry Ticket Activity** and cut out one cell phone image per student. Students will require drawing supplies.
- ☐ Bring salt, plastic spoons and water to class for **Step 3** to illustrate the size of an ova or egg for each student.
- ☐ Print the **Five Points Worksheet** for each student.

PROCEDURE

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

Hand out one cell phone image to each student at the beginning of the class. Have students draw the reproductive system from memory, inside the instateenFEMM image provided.



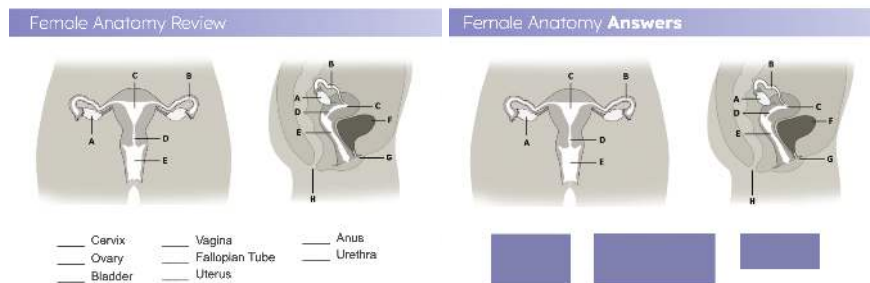
Give students a couple of minutes and then ask students how they think they did.



Note that knowing about the reproductive system is an integral part of knowing about themselves and how their body works. However, many people don't actually know how all of these parts work together, or that hormones are directed by the brain, and that our reproductive health impacts our overall health, energy, mood, metabolism, skin... and so much more! This lesson we're going to look at the ovaries and the production of the two main female hormones: estrogen and progesterone.

Step 2 (5 minutes): Review Female Reproductive Anatomy

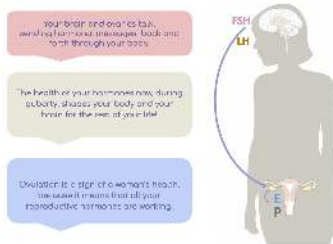
First, let's briefly review the anatomy parts and how ovulation is an important sign of health. Have students name the parts of the reproductive anatomy out loud. *Click on the slide to reveal the answers A-H.*



Step 3 (15 minutes): Puberty, the Hormonal Axis and the Ovulatory Cycle

As you begin puberty, hormonal messages are sent from the brain to the reproductive system to start the physical changes that you notice on the outside: hair growth, breast growth, increased sweating, changes in body shape and even emotional changes. What you can't necessarily see is that your brain and your ovaries (point out the ovaries on the slide) are linked in "Hormonal Axis".

Puberty and the Hormonal Axis

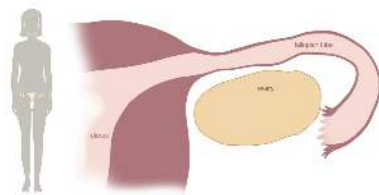


The **Hormonal Axis** is a way of describing the important link that develops as of puberty, between the brain and the ovaries, as they work together to prepare your body for ovulation.

What is ovulation? Approximately once a month, an egg or “ova” (think oval, like the shape of an egg) is released from the ovary. Because this process starts, ends and begins again, it is called a cycle. You may have heard it called the *menstrual cycle* or some people talk about getting your period, menses, menarche, etc. In fact, the more precise term for the menstrual cycle is the **ovulatory cycle**, because ovulation is really the main event.

Let’s go through the process of ovulation, step by step.

Ovulation: a sign of health



1.

The human female body has two ovaries, one on each side of the uterus. On this slide, we have zoomed in on one ovary - the right side - so that we can get a better look at what happens inside.

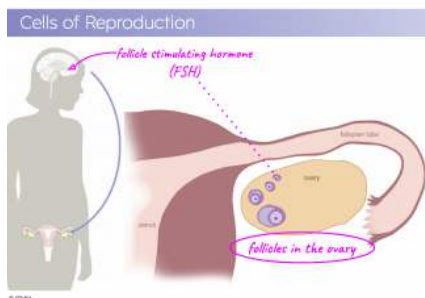


2.

Inside each ovary, the female cells of reproduction: the ova or “eggs”, are stored. They are tiny cells, about $\frac{1}{4}$ the size of a grain of salt!

Give each student a small teaspoon of salt in their hand, for them to examine a single grain and imagine an egg cell of reproduction $\frac{1}{4}$ of that size.

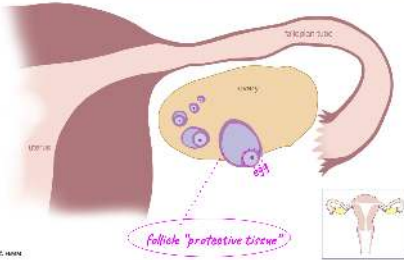
Each one of these eggs contains a copy of all of your DNA. That’s 23 chromosomes containing everything that makes you, you! In something even smaller than a grain of salt! Amazing, right?



3.

To kickstart the ovulatory cycle, the brain releases a hormone called FSH which stands for “*Follicle Stimulating Hormone*”. This hormone “stimulates” (causes to grow) one egg each month. The ovaries “take turns” each month. The hormone FSH comes from the brain and acts on the ovary, to grow an egg. *Click on the slide to show the egg increasing in size.*

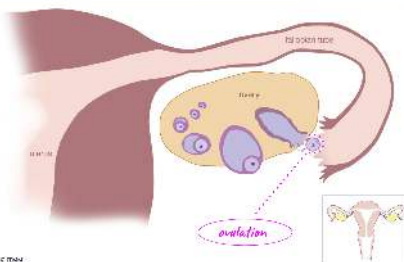
The Egg + Follicle



4.

The egg is inside a special, protective tissue that acts like a sac around it called a **follicle** (point out the small egg and the follicle surrounding the egg, in the image). Both the egg and follicle grow together. The egg and follicle inside the ovary produce one of the main female hormones: **estrogen**.

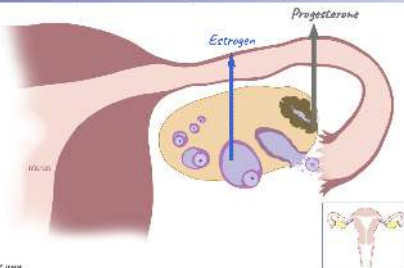
Ova (egg) released = Ovulation



5.

When the egg and follicle have grown and matured to the correct size, and when estrogen is at its peak, the egg bursts from its follicle into the fallopian tube. This event is called **ovulation**.

The ovary makes estrogen and progesterone



6.

As we said, the growing egg and follicle leading up to ovulation produce **estrogen**. The bigger the egg and follicle get, the more and more estrogen they produce in the body. After ovulation, **the empty follicle** (shown here in brown) becomes a new tissue that produces the second main female hormone: **progesterone**.

Estrogen and Progesterone do a lot of amazing things for your mind and body that we'll look at in the next lesson.

7. Wait, what happens to the egg? The egg enters the fallopian tube and if it comes into contact with the male cell of reproduction, sperm, then the sperm fertilizes the egg and a new human life is formed. *But, on its own, what happens to the egg each cycle?*

Give each student a plastic spoon and a little bit of water in the spoon. Instruct students to put their grains of salt in the water.

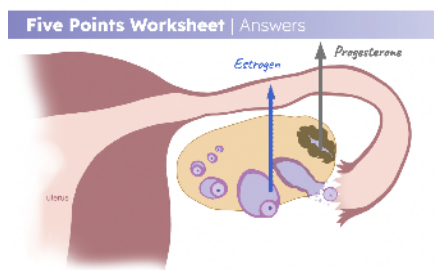
Ask: What happens to the grains of salt? They dissolve. The same is true for the unfertilized egg each cycle. It simply dissolves in the fallopian tube and a few days later. The lining of the uterus sheds as a woman gets her period, and the next cycle starts.

Step 4 (5 minutes): Five Points Worksheet

Hand out the worksheet **Five Points Worksheet** for students to complete. See if students can get all five points about the ovulation cycle.



Review the answers by clicking through the animations one by one on the next slide.



Step 5 (5 minutes): Review: True or False

Let's do a final review of the things we learned today about the reproductive system and the ovulatory cycle.

True or False:

True or False?

1. In puberty, your hormonal axis is still developing.
TRUE FALSE
2. Ovulation is the bursting of the mature egg from the follicle.
TRUE FALSE
3. The hormones Estrogen and Progesterone are not important to your health.
TRUE FALSE
4. A healthy period comes at the end of a healthy ovulatory cycle.
TRUE FALSE
5. The egg travels to the bladder after ovulation.
TRUE FALSE

1. In puberty, your hormonal axis is still developing
2. Ovulation is the bursting of the mature egg from the follicle.
3. The hormones Estrogen and Progesterone are not important to your health.
4. A healthy period comes at the end of a healthy ovulatory cycle.
5. The egg travels to the bladder after ovulation.

Click on the next slide to reveal the answers.

ANSWERS True or False?

1. In puberty, your hormonal axis is still developing.
TRUE FALSE
2. Ovulation is the bursting of the mature egg from the follicle.
TRUE FALSE
3. The hormones Estrogen and Progesterone are not important to your health.
TRUE FALSE *They are!*
4. A healthy period comes at the end of a healthy ovulatory cycle.
TRUE FALSE
5. The egg travels to the bladder after ovulation.
TRUE FALSE *It travels to the uterus!*

CONCLUSION

Next lesson, we will learn more about hormones and why they are so important to overall health, especially right now during your development in puberty. We will also learn about menstruation and what a healthy cycle looks like for teens your age.

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>

Brown, J.B. (2011). Types of ovarian activity in women and their significance: the continuum (a reinterpretation of early findings), *Human Reproduction Update*, 17(2), 141-158. <https://10.1093/humupd/dmq040>

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