

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
- **Worksheet: Why is Ovulation Important?** + Answer Key

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 after ovulation.
- **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.
- **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.

PREPARATION

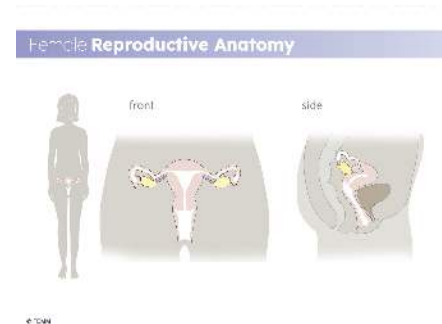
- ☐ Print copies of the **Why is Ovulation Important?** Worksheet for each group (groups can be 2-3 students).
- ☐ Print the **Why is Ovulation Important?** Answer Key to review.

PROCEDURE

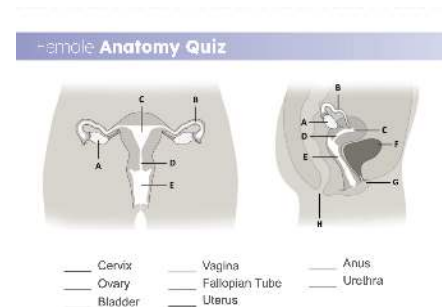
Step 1 (optional 5-minute activity): Review answers from *“Do you still have any questions about the female or male reproductive anatomy?”* gathered during last class.



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

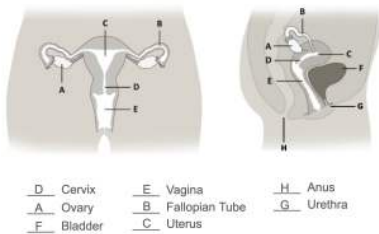


Let's briefly review the anatomy of the female reproductive system. On this slide, we can see the basic parts, the uterus, ovaries, fallopian tubes, cervix, and vagina. In the side view, we can see all of these same parts, as well as the bladder, anus, and urethra. Let's see if we can label these parts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



Have students identify the labeled anatomy. On the following slide, click to reveal each answer.

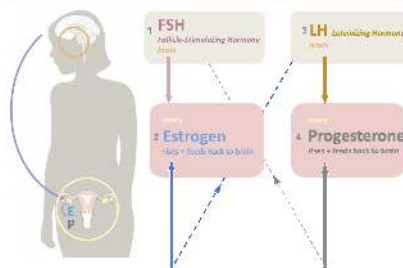
Answers | Female Anatomy Quiz



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

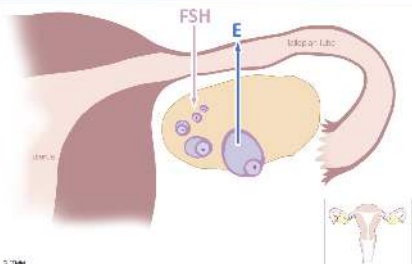
Before we take a closer look at the process of ovulation, it's important to remember the fab four main female reproductive hormones: FSH, estrogen, LH, and progesterone.

The Fab Four Main Female Hormones



1. **Follicle stimulating hormone (FSH)** is a hormone produced in the brain, by the pituitary gland.

Ovulation: FSH + Estrogen

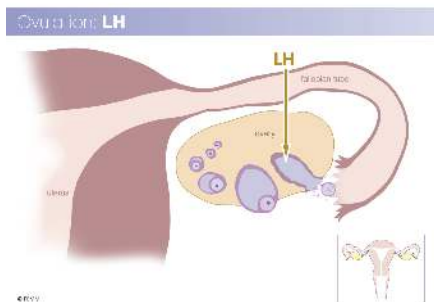


It does exactly what its name suggests; Follicle Stimulating Hormone sends a message to the ovaries to stimulate the growth and development of an egg and follicle in the ovary.

2. The egg and follicle grow in the ovary, producing more and more **estrogen**. **When the**

level of estrogen is sufficiently high, this acts like a feedback loop sending a message back to the brain.

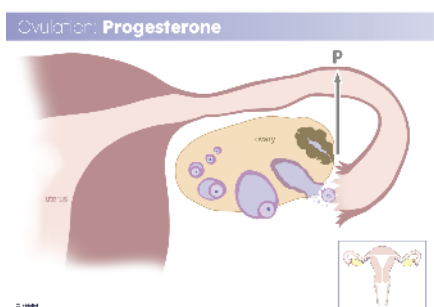
3. The hormone estrogen signals the brain to stop the release of **FSH** and to release **Luteinizing Hormone (LH)**.



This usually happens around day thirteen of the cycle. **LH** triggers the release of the egg from the follicle and ovulation occurs.

In ovulation, the egg is released into the **fallopian tube**. As you can see, there are two ovaries, and they usually alternate - one month the left ovary releases an egg and the next month the right ovary does.

4. After ovulation, the empty follicle is recycled into a new tissue called the corpus luteum, which produces the hormone **progesterone**.



Corpus luteum is Latin for 'yellow body' as it is yellowish in color under a microscope.

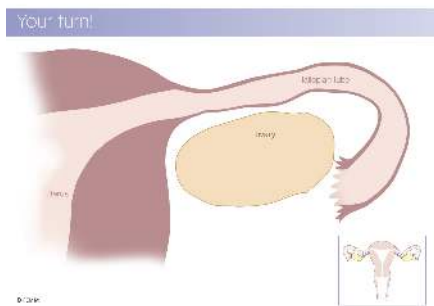
Now, what happens to the egg? Cycle after cycle, the egg simply dissolves in the fallopian tubes, the corpus luteum breaks down and menstruation happens about two weeks later.

However, if the egg joins together with sperm (the male cell of reproduction), the

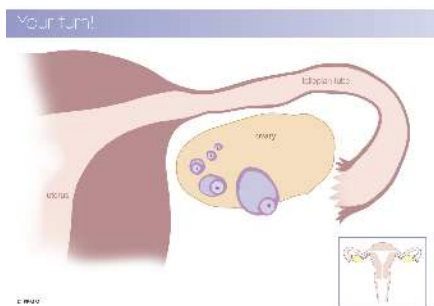
fertilized egg, the beginning of a new human life, will travel through the fallopian tube to implant in the lining of the uterus. Progesterone levels will continue to rise to support a pregnancy.

All of this activity happening in our reproductive system month to month isn't just necessary for reproduction. Ovulation and **the fab four hormones have a major impact on our overall health!**

Step 4 (5 minutes): *Now it's the students' 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.

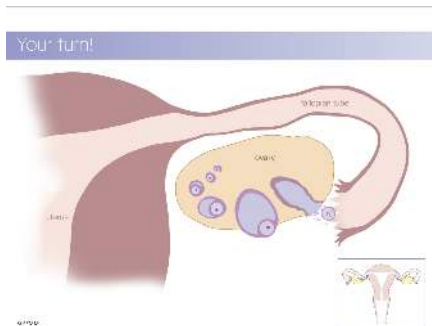


Ask: What happens to the egg and the follicle? Which hormone do they produce?

As the egg and follicle grow inside the ovary, the growing and maturing egg and follicle produce 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?

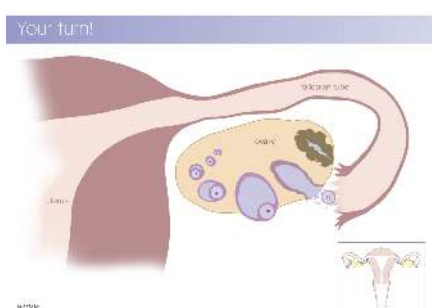
Once ovulation takes place, the egg travels to the fallopian tube. It’s in the fallopian tube that the egg meets sperm, in the case of intercourse. If fertilization occurs, the sperm joins with the egg and together a new life is formed that will implant in the uterus to continue to grow. If fertilization 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.

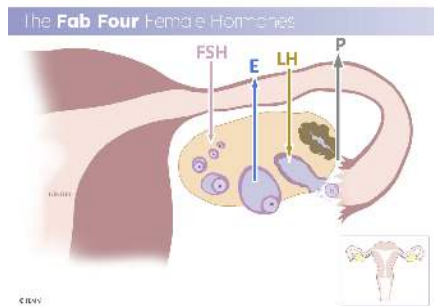
Ask: What happens in the ovary after ovulation?

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** (Follicle Stimulating Hormone) initiates this process, which starts in the brain. When FSH signals the ovaries, an egg and follicle in the ovary start to develop. As they grow and develop, they produce **estrogen**. Once estrogen reaches a certain level, it triggers **LH** (Luteinizing Hormone) 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**.

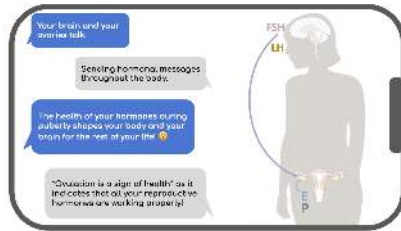
Ovulation happens once a month. This is why in teenFEMM, the monthly cycle is referred to as the **ovulation cycle**.

This is a good moment to acknowledge that the ovulation cycle is often referred to as the menstrual cycle. This isn't incorrect, but '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): *The hormonal axis, 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 happening every month?

The Fab Four: Hormones and Your Development



As you go through puberty, the **hormonal axis** is still developing. The brain is the command center, communicating with the reproductive system to send hormonal messages throughout the body. These hormones are vital to growth and development! Did you know that the overall health of your hormones during puberty shapes your body and your brain for life?

Effects of Estrogen & Progesterone on your body

	Estrogen	Progesterone
uterus	forms, 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

Ovulation is a sign of hormonal health because ovulation indicates that your brain and your ovaries are communicating well, and that all four main female 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, sleep well, and stimulate brain cells.

Step 6: (10 minutes) Worksheet: “Why is Ovulation Important?”



Divide students into small groups. Hand out the “Why is Ovulation Important?” **Worksheet** to each group. Explain that you will show the previous slide (with the effects of estrogen and progesterone on the whole body) for ten seconds, to allow groups to study and remember everything they can from the slide. At “go”, groups will turn over their worksheet and write down as many effects they can recall from the previous slide or from the lesson. After four minutes, the group with the most correct answers, wins!

Review answers using the **Answer Key** provided in the materials.

CONCLUSION

Review

- Ovulation is a marker for health and hormone levels.
- There are four main reproductive hormones involved in ovulation: FSH, estrogen, LH, and progesterone.
- We need the right amounts of estrogen and progesterone in our bodies to be at our best, physically and mentally.

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

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