22.7: Menstrual Cycle

Taboo Topic

The banner in the photo above was carried in a 2014 march in Uganda as part of the celebration of Menstrual Hygiene Day. Menstrual Hygiene Day is an awareness day on May 28 of each year that aims to raise awareness worldwide about menstruation and menstrual hygiene. Maintaining good menstrual hygiene is difficult in developing countries like Uganda because of taboos on discussing menstruation and lack of availability of menstrual hygiene products. Poor menstrual hygiene, in turn, can lead to embarrassment, degradation, and reproductive health problems in females. May 28 was chosen as Menstrual Hygiene Day because of its symbolism. May is the fifth month of the year, and most women average five days of menstrual bleeding each month. The 28th day was chosen because the menstrual cycle averages about 28 days.

Figure 22.7: (CC BY 2.0; Water for People Uganda; via [wikimedia.org](https://commons.wikimedia.org/wiki/File:Menstrual_Hygiene_Day_Uganda.jpg))
What Is the Menstrual Cycle?

The **menstrual cycle** refers to natural changes that occur in the female reproductive system each month during the reproductive years. The cycle is necessary for the production of eggs and the preparation of the uterus for pregnancy. It involves changes in both the ovaries and the uterus and is controlled by pituitary and ovarian hormones. Day 1 of the cycle is the first day of the menstrual period, when bleeding from the uterus begins as the built-up endometrium lining the uterus is shed. The endometrium builds up again during the remainder of the cycle, only to be shed again during the beginning of the next cycle if pregnancy does not occur. In the ovaries, the menstrual cycle includes the development of a follicle, ovulation of a secondary oocyte, and the degeneration of the follicle if pregnancy does not occur. Both uterine and ovarian changes during the menstrual cycle are generally divided into three phases, although the phases are not the same in the two organs.
Menarche and Menopause

The female reproductive years are delineated by the start and stop of the menstrual cycle. The first menstrual period usually occurs around 12 or 13 years of age, an event that is known as menarche. There is considerable variation among individuals in the age of menarche. It may occasionally occur as early as eight years of age or as late as 16 years of age and still be considered normal. The average age is generally later in the developing world, and earlier in the developed world. This variation is thought to be largely attributable to nutritional differences.

The cessation of menstrual cycles at the end of a woman's reproductive years is termed menopause. The average age of menopause is 52 years, but it may occur normally at any age between about 45 and 55 years of age. The age of menopause varies due to a variety of biological and environmental factors. It may occur earlier as a result of certain illnesses or medical treatments.

Variation in the Menstrual Cycle

The length of the menstrual cycle — as well as its phases — may vary considerably, not only among different women but also from month to month for a given woman. The average length of time between the first day of one menstrual period and the first day of the next menstrual period is 28 days, but it may range from 21 days to 45 days. Cycles are considered regular when a woman's longest and shortest cycles differ by less than eight days. The menstrual period itself is usually about five days long, but it may vary in length from about two days to seven days.

Ovarian Cycle

The events of the menstrual cycle that take place in the ovaries make up the ovarian cycle. It consists of changes that occur in the follicles of one of the ovaries. The ovarian cycle is divided into the following three phases: the follicular phase, ovulation, and luteal phase. These phases are illustrated in the figure below.

![Ovarian Cycle Diagram](https://bio.libretexts.org/Bookshelves/Human_Biology/Book%3A_Human_Biology_(Wakim_and_Grewal)/22%3A_Reproductiv…)

Follicular Phase

The follicular phase is the first phase of the ovarian cycle. It generally lasts about 12 to 14 days for a 28-day menstrual cycle. During this phase, several ovarian follicles are stimulated to begin maturing, but usually only one — called the
Graafian follicle — matures completely so it is ready to release an egg. The other maturing follicles stop growing and disintegrate. Follicular development occurs because of a rise in the blood level of follicle-stimulating hormone (FSH), which is secreted by the pituitary gland. The maturing follicle releases estrogen, the level of which rises throughout the follicular phase. You can see these and other changes in hormone levels that occur during the menstrual cycle in the following chart.

![Figure 3](https://bio.libretexts.org/Bookshelves/Human_Biology/Book%3A_Human_Biology_(Wakim_and_Grewal)/22%3A_Reproductiv…)

**Ovulation**

Ovulation is the second phase of the ovarian cycle. It usually occurs around day 14 of a 28-day menstrual cycle. During this phase, the Graafian follicle ruptures and releases its egg. Ovulation is stimulated by a sudden rise in the blood level of luteinizing hormone (LH) from the pituitary gland. This is called the LH surge. You can see the LH surge in the top hormone graph above. The LH surge generally starts around day 12 of the cycle and lasts for a day or two. The surge in LH is triggered by a continued rise in estrogen from the maturing follicle in the ovary. During the follicular phase, the rising estrogen level actually suppresses LH secretion by the pituitary. However, by the time the follicular phase is nearing its end, the level of estrogen reaches a threshold level above which this effect is reversed, and estrogen stimulates the release of a large amount of LH. The surge in LH matures the egg and weakens the wall of the follicle, causing the fully developed follicle to release its secondary oocyte.

**Luteal Phase**

The luteal phase is the third and final phase of the ovarian cycle. It typically lasts about 14 days in a 28-day menstrual cycle. At the beginning of the luteal phase, FSH and LH cause the Graafian follicle that ovulated the egg to transform into a structure called a corpus luteum. The corpus luteum secretes progesterone, which in turn suppresses FSH and LH production by the pituitary and stimulates the continued buildup of the endometrium in the uterus. How this phase ends depends on whether or not the egg has been fertilized.

- If fertilization has not occurred, the falling levels of FSH and LH during the luteal phase cause the corpus luteum to atrophy, so its production of progesterone declines. Without a high level of progesterone to maintain it, the endometrium starts to break down. By the end of the luteal phase, the endometrium can no longer be maintained, and the next menstrual cycle begins with the shedding of the endometrium (menses).
• If fertilization has occurred so a zygote forms and then divides to become a blastocyst, the outer layer of the blastocyst produces a hormone called human chorionic gonadotropin. This hormone is very similar to LH and preserves the corpus luteum. The corpus luteum can then continue to secrete progesterone to maintain the new pregnancy.

Uterine Cycle

The events of the menstrual cycle that take place in the uterus make up the **uterine cycle**. This cycle consists of changes that occur mainly in the endometrium, which is the layer of tissue that lines the uterus. The uterine cycle is divided into the following three phases: menstruation, proliferative phase, and secretory phase. These phases are illustrated in the figure below.

![Uterine Cycle Phases](https://bio.libretexts.org/Bookshelves/Human_Biology/Book%3A_Human_Biology_(Wakim_and_Grewal)/22%3A_Reproductiv...)

**Menstruation**

**Menstruation** (also called menstrual period or menses) is the first phase of the uterine cycle. It occurs if fertilization has not taken place during the preceding menstrual cycle. During menstruation, the endometrium of the uterus, which has built up during the preceding cycle, degenerates and is shed from the uterus. The average loss of blood during menstruation is about 35 mL. The flow of blood is often accompanied by uterine cramps, which may be severe in some women.

**Proliferative Phase**

The **proliferative phase** is the second phase of the uterine cycle. During this phase, estrogen secreted by cells of the maturing ovarian follicle causes the lining of the uterus to grow, or proliferate. Estrogen also stimulates the cervix of the uterus to secrete larger amounts of thinner mucus that can help sperm swim through the cervix and into the uterus, making fertilization more likely.

**Secretory Phase**

The **secretory phase** is the third and final phase of the uterine cycle. During this phase, progesterone produced by the corpus luteum in the ovary stimulates further changes in the endometrium so it is more receptive to implantation of a blastocyst. For example, progesterone increases blood flow to the uterus and promotes uterine secretions. It also
decreases the contractility of smooth muscle tissue in the uterine wall.

**Summary**

- The menstrual cycle refers to natural changes that occur in the female reproductive system each month during the reproductive years, except when a woman is pregnant. The cycle is necessary for the production of eggs and the preparation of the uterus for pregnancy. It involves changes in both the ovaries and uterus and is controlled by pituitary hormones (FSH and LH) and ovarian hormones (estrogen and progesterone).

- The female reproductive period is delineated by menarche, or the first menstrual period, which usually occurs around age 12 or 13; and by menopause, or the cessation of menstrual periods, which typically occurs around age 52. A typical menstrual cycle averages 28 days in length but may vary normally from 21 to 45 days. The average menstrual period is five days long but may vary normally from two to seven days. These variations in the menstrual cycle may occur both between women and within individual women from month to month.

- The events of the menstrual cycle that take place in the ovaries make up the ovarian cycle. It includes the follicular phase (when a follicle and its egg mature due to rising levels of FSH), ovulation (when the egg is released from the ovary due to a rise in estrogen and a surge in LH), and the luteal phase (when the follicle is transformed into a structure called a corpus luteum that secretes progesterone). In a 28-day menstrual cycle, the follicular and luteal phases typically average about two weeks in length, with ovulation generally occurring around day 14 of the cycle.

- The events of the menstrual cycle that take place in the uterus make up the uterine cycle. It includes menstruation, which generally occurs on days 1 to 5 of the cycle and involves shedding of endometrial tissue that built up during the preceding cycle; the proliferative phase, during which the endometrium builds up again until ovulation occurs; and the secretory phase, which follows ovulation and during which the endometrium secretes substances and undergoes other changes that prepare it to receive an embryo.

**Review**

1. What is the menstrual cycle?

2. Why is the menstrual cycle necessary in order for pregnancy to occur?

3. What organs are involved in the menstrual cycle? What hormones control the cycle?

4. Identify the two major events that mark the beginning and end of the reproductive period in females. When do these events typically occur?

5. Discuss the average length of the menstrual cycle and menstruation, as well as variations that are considered normal.

6. Define the ovarian cycle.

7. Summarize the phases of the ovarian cycle.

8. Compare and contrast events that occur in the ovaries and uterus, depending on whether or not an egg is fertilized during the menstrual cycle.

9. Define the uterine cycle.
10. Give an overview of the phases of the uterine cycle.

11. If the LH surge did not occur in a menstrual cycle, what do you think would happen? Explain your answer.

12. Give one reason why FSH and LH levels drop in the luteal phase of the menstrual cycle.

13. What does the follicle that housed the ovulated egg become in the luteal phase of the menstrual cycle?

14. True or False: Day 1 of the menstrual cycle is when the secondary oocyte is released from its follicle.

15. True or False: The secretory phase of the uterine cycle generally aligns with the luteal phase of the ovarian cycle.

Explore More

https://bio.libretexts.org/link?17796#Explore_More

Have you ever heard of premenstrual syndrome, also known as PMS? Learn more about what it is and why some women get it here:

Imagine having to use old clothes, rags, paper, or leaves to soak up menstrual blood. Imagine being embarrassed or humiliated to have your period. Some girls in the developing world don’t have access to menstrual hygiene products. Check out this video to learn more:

https://bio.libretexts.org/Bookshelves/Human_Biology/Book%3A_Human_Biology_(Wakim_and_Grewal)/22%3A_Reproductiv…

Updated: Thu, 15 Oct 2020 04:21:08 GMT
Powered by
Media, iframe, embed and object tags are not supported inside of a PDF.