



Ovarian & Uterine Cycle

Ovarian cycle – Describes the development and release of the oocyte (or immature egg) in the ovary and changes in the follicles. Usually occurs within ~28 days. This cycle consists of the follicular phase and the luteal phase.

Uterine cycle – Describes the preparation of the inner lining of the uterus (endometrium) for implantation by a fertilized egg and shedding of the lining when implantation has failed. Usually occurs within ~28 days. This cycle consists of menses (menstruation), the proliferative phase and the secretory phase.

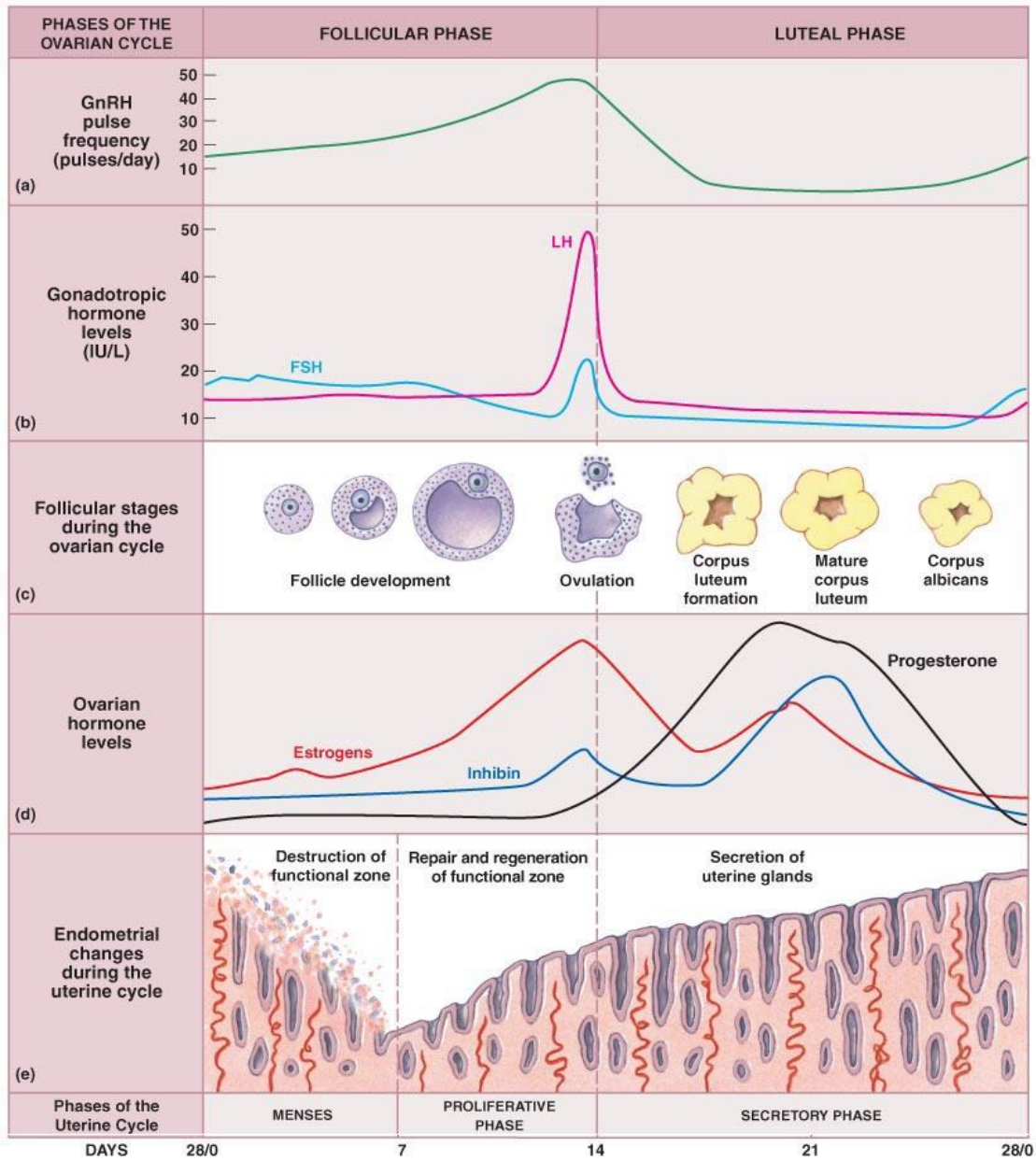
The two cycles occur concurrently and are tightly regulated by hormones released from the *endocrine system*. The changes in the ovary are regulated by hormones released from the anterior pituitary gland and the changes observed in the uterine cycle are regulated by hormones released from the ovary during the ovarian cycle. Below is a summary of the hormonal events controlling these cycles and the anatomical changes that occur in the ovary and uterus.

Steps	Stimulus	Target Location	Result
1	Gonadotropin releasing hormone (GnRH) is released by the hypothalamus.	Anterior pituitary gland	Stimulates the release of follicle stimulating hormone (FSH). This starts the follicular phase .
2	FSH is released from the anterior pituitary gland into blood.	Ovary	Stimulates follicle development in the ovaries. As follicles mature, they start releasing estrogen and inhibin into blood.
3	Estrogen concentrations increase in blood.	Hypothalamus	Causes increase in GnRH production.
	Inhibin concentrations increase in blood.	Uterus Anterior pituitary gland	Causes endometrium to develop and regenerate. This starts the proliferative phase . Inhibits further release of FSH.
4	Increased GnRH production.	Anterior pituitary gland	Stimulates the release of luteinizing hormone (LH) into blood.



5	Sudden increase in LH in blood.	Ovaries	Causes ovulation to occur at day 14 of the cycle. Promotes formation of corpus luteum from the follicle. The corpus luteum produces progesterone and some estrogen. This starts the <i>luteal phase</i> .
6	Progesterone and estrogen concentrations in blood increases.	Uterus Hypothalamus	Causes endometrium to thicken further and produce secretions. This starts the <i>secretory phase</i> . Decreases production of GnRH.
7	Decreased GnRH production.	Anterior pituitary gland	Decreases the release of LH.
8	Decrease of LH in blood.	Ovaries	Corpus luteum begins to degenerate – progesterone and estrogen decreases.
9	Progesterone and estrogen concentrations in blood decreases.	Hypothalamus Uterus	Begins production of GnRH. Starts the cycle all over again. Endometrium is shed. This starts <i>menstruation</i> .





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QUESTIONS

- Most oral contraceptives (birth control pills) contain estrogen and progesterone. Use your understanding of the hormones involved in the ovarian and uterine cycles to explain how pregnancy is prevented when birth control pills are used.
- When a fertilized egg is implanted in the endometrium, it begins the secretion of a hormone called **human chorionic gonadotropin (HCG)**. The increase of HCG concentrations in the blood prevents the corpus luteum from breaking down. Use your understanding of the ovarian and uterine cycles to explain how the maintenance of the corpus luteum prevents menstruation from occurring.



ANSWERS

1. If estrogen and progesterone levels remain high, GnRH concentrations will remain low even when the corpus luteum degenerates. The ovarian and uterine cycles cannot start over again. With low levels of GnRH, FSH is not produced and new follicles cannot mature. Without mature follicles and without ovulation, no egg will enter the fallopian tubes and no fertilization can occur. This is how pregnancy is prevented.
2. When HCG maintains the corpus luteum, progesterone and estrogen levels remain high. This keeps the uterine cycle in the secretory phase, ensuring that the implanted egg is not lost during menstruation. Menstruation occurs only when the progesterone and estrogen levels decrease.

