

Ovulation

Ovulation in a woman who has a normal 28-day female sexual cycle occurs 14 days after the onset of menstruation. About two days before ovulation, a surge of LH secretion, 6- to 10-fold above normal, occurs. This LH surge is necessary for ovulation to occur. Associated with the LH surge, the thecal cells begin to secrete progesterone for the first time. The blood flow in the thecal layers increases at this time, as does the rate of transudation of fluid into the vesicle. The thecal cells also secrete a proteolytic enzyme into the follicular fluid. At a point of weakness in the wall of the follicle on the surface of the ovary, a protrusion, or stigma, develops. The wall ruptures at the stigma within 30 minutes of its formation; and within minutes of the rupture, the follicle evaginates, and the oocyte and surrounding layers of granulosa cells, referred to as the corona radiata, leave the vesicle and enter the abdominal cavity at the opening to the fallopian tube.

Corpus Luteum—"Luteal Phase of the Ovarian Cycle"

The structure of the follicle remaining on the surface of the ovary after ovulation contains layers of granulosa and thecal cells. The high concentration of LH before ovulation converts these cells to lutein cells, which enlarge after ovulation and become yellowish; this structure is referred to as the corpus luteum. The granulosa cells secrete large amounts of progesterone and smaller amounts of estrogen, and the thecal cells produce androgenic hormones, testosterone, and androstenedione, most of which are converted by the granulosa cells to the female hormones. The cells of the corpus luteum require stimulation by the preovulatory surge of LH to undergo transformation and proliferation. The corpus luteum secretes large amounts of progesterone and estrogen for approximately 12 days under the continuing stimulatory influence of the declining concentration of LH.

After 12 days, when LH levels are minimal due to feedback inhibition of the hypothalamus by estrogen and progesterone, the corpus luteum degenerates and ceases to secrete hormones. Within 2 days of failure of the corpus luteum, menstruation begins (see subsequent discussion). At the same time, FSH and LH secretion from the pituitary begins to increase owing to the absence of inhibition of the hypothalamus by estrogen and progesterone. As the concentration rises in the blood of the stimulatory hormones from the pituitary, a new group of primary

follicles begins to develop, initiating another cycle.

Summary of Ovarian Cycle

About every 28 days, gonadotropic hormones from the anterior pituitary gland cause about 8 to 12 new follicles to begin to grow in the ovaries. One of these follicles finally becomes “mature” and ovulates on the 14th day of the cycle. During growth of the follicles, mainly estrogen is secreted.

After ovulation, the secretory cells of the ovulating follicle develop into a corpus luteum that secretes large quantities of both major female hormones, progesterone and estrogen. After another 2 weeks, the corpus luteum degenerates, whereupon the ovarian hormones estrogen and progesterone decrease greatly, and menstruation begins. A new ovarian cycle then follows.