



جامعة الأزهر - غزة
AL-AZHAR UNIVERSITY-GAZA



Physiology female reproductive system III



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.



Corpus Luteum—“Luteal” Phase of the Ovarian Cycle

- 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 continued 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.



Corpus Luteum—“Luteal” Phase of the Ovarian Cycle

- 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 the 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, estrogen is the main hormone secreted.
- After ovulation, the secretory cells of the ovulating follicle develop into a corpus luteum that secretes large quantities of the major female hormones, progesterone and estrogen.

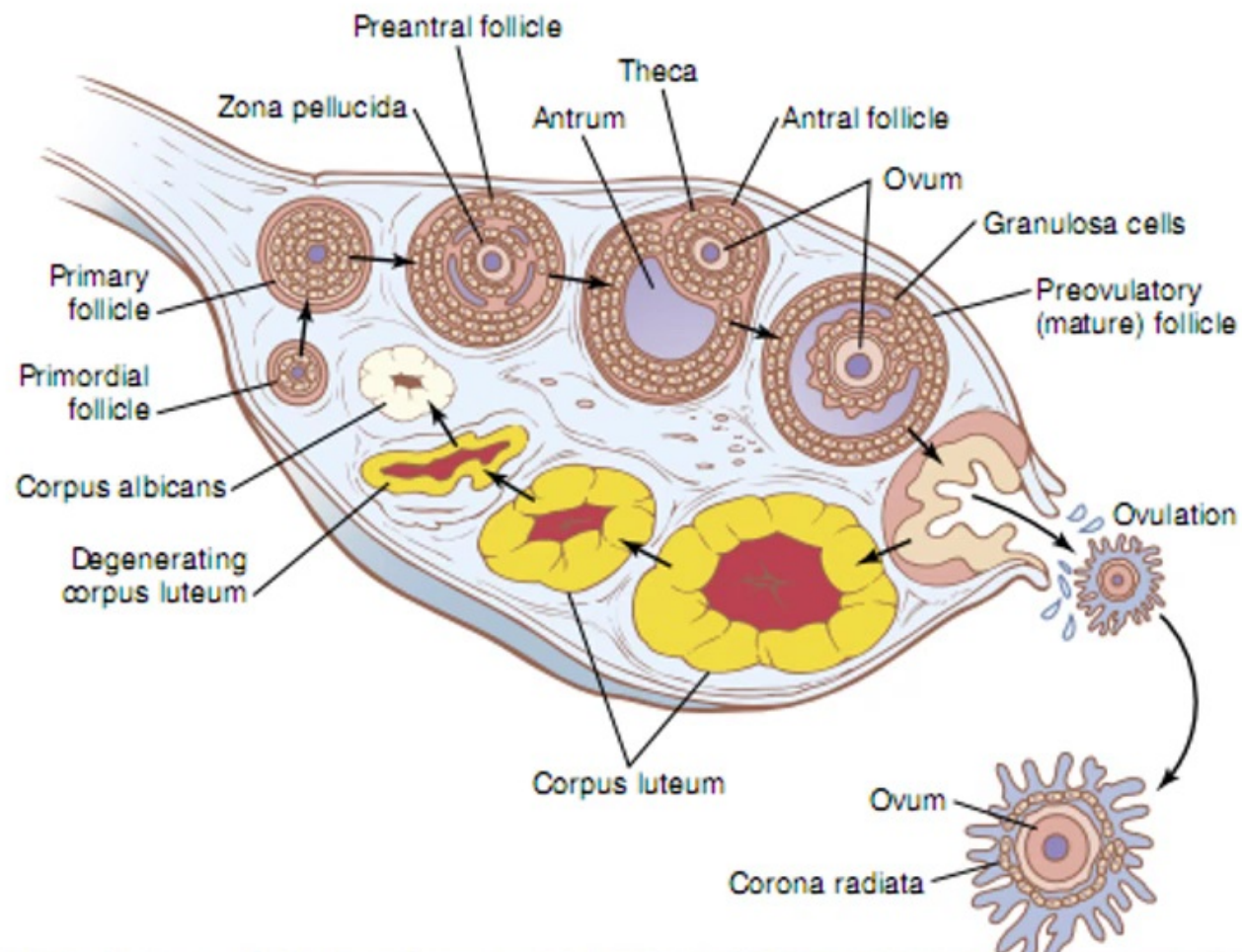




Summary of the Ovarian Cycle

- 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.





stages of follicular growth
also showing formation of



FUNCTIONS OF THE OVARIAN HORMONES— ESTRADIOL AND PROGESTERONE

- The ovaries secrete two classes of hormones: estrogens and progestins. Estradiol is the most important of the estrogens, and progesterone is the dominant progestin.
- In the nonpregnant female, essentially all of the estrogen compounds are secreted from the ovaries, with only minute amounts being synthesized in the adrenal cortex.
- Nearly all of the progesterone in nonpregnant females is produced in the corpus luteum; only small amounts are formed in the mature follicle during the day immediately before ovulation.





Functions of the Estrogens

- Estrogens cause growth and proliferation of the cells of the female sex organs and other tissues associated with reproduction.
- Estrogens Stimulate the Growth and Development of the Uterus and External Female Sex Organs.
- At puberty, levels of estrogen rise rapidly, causing rapid growth in the ovaries, fallopian tubes, uterus, vagina, and external genitalia.
- The lining of the uterus, the endometrium, becomes thickened under the effect of estrogen, as discussed later





Functions of the Estrogens

- Estrogens Stimulate Development of Stroma Tissue of the Breasts, Growth of an Extensive Ductile System, and Deposition of Fat in the Breasts. Estrogens initiate growth of the breasts and of the milk-producing apparatus.
- They are also responsible for the characteristic growth and external appearance of the mature female breast.
- However, they do not complete the job of converting the breasts into milk-producing organs.





Functions of the Estrogens

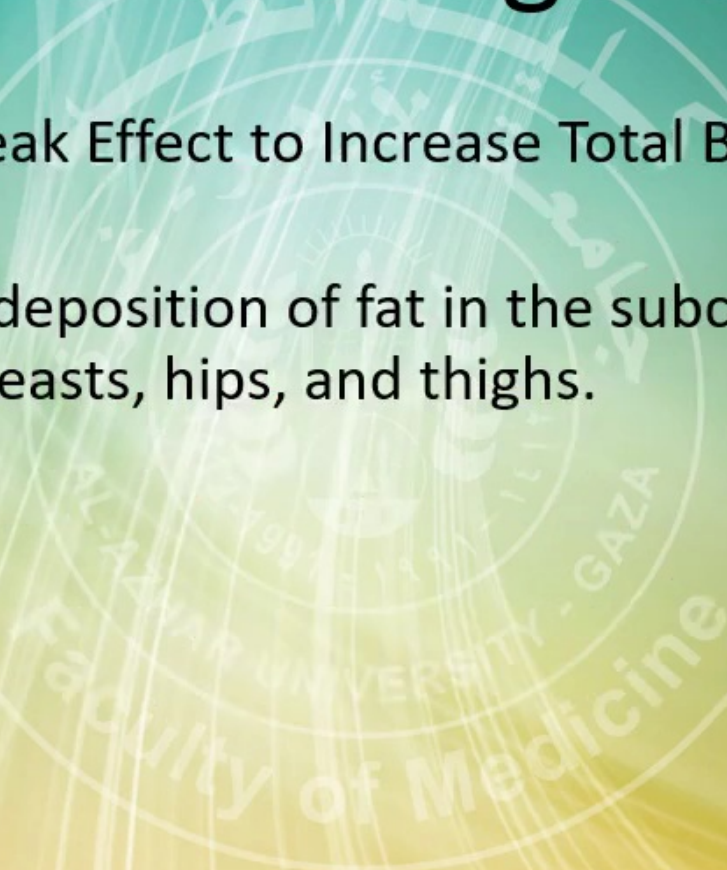
- Estrogens Cause Growth of the Skeleton by Stimulating Osteoblastic Activity.
- At puberty, the effect on the osteoblast causes a period of rapid growth in the long bones, although this “growth spurt” lasts only a few years because of the effect of estrogen to cause closure of the epiphyses of the bones.
- Longitudinal growth occurs only at the epiphyses, so once they are closed, additional lengthening of the bones cannot take place.

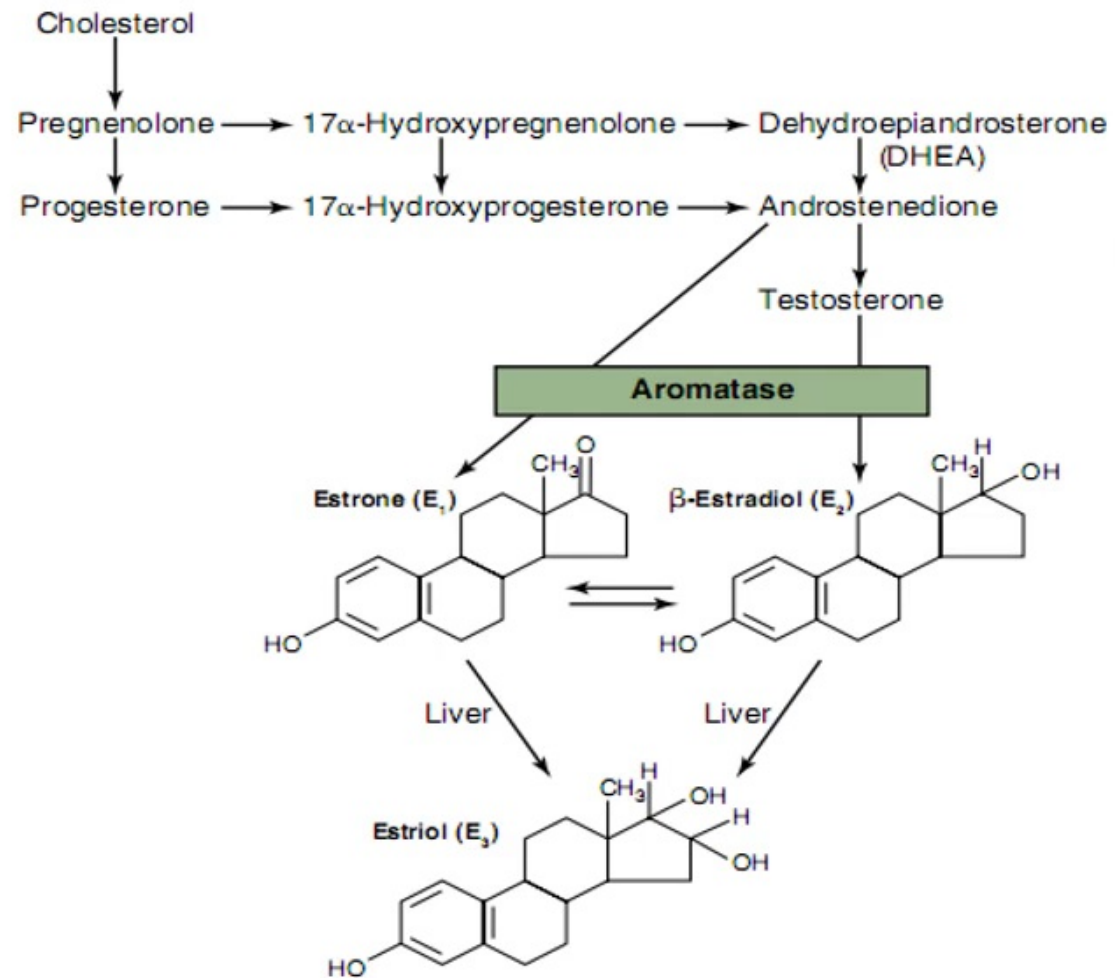




Functions of the Estrogens

- Estrogens Have a Weak Effect to Increase Total Body Protein and Metabolic Rate.
- Estrogen promotes deposition of fat in the subcutaneous tissue, particularly in the breasts, hips, and thighs.







Estrogens

- C18 steroids
- Types:
 - Estradiol E2: most potent & most predominant
 - Estrone E1
 - Estriol E3: lest potent
- Secretion: Cholesterol → LH, Theca cells → Androgens → Aromatase, FSH, Granulosa cells → Estradiol
- Sources:
 - Ovary 2 peaks
 - Placenta
 - Adrenal cortex

Preovulatory	Midluteal
Just before ovulation	Midluteal
Graffian follicle	C. luteum
Granulosa cells & theca cells	Lutein cells
250 ug/dl	250 ug/dl:
380 ug/dl	Smaller
	Larger

N.B. Estradiol production in men 50 ug/day

