➢ HORMONAL CONTROL OF THE FEMALE REPRODUCTIVE SYSTEM

- The first day of the menstrual cycle is the first day of menstruation (the first day of blood loss from the uterus). The menses (menstruation) usually last 5 to 7 days. The average menstrual cycle lasts about 28 days.

Testosterone has the following effects in the female: (mostly from the adrenal cortex)
1. responsible for sex drive (libido)
2. maintains muscle mass

THE FOLLICULAR PHASE OF THE MENSTRUAL CYCLE

- During the follicular phase (the first 14 days of the menstrual cycle), the **granulosa cells and theca interna cells** in the developing follicles in the ovary produce increasing amounts of estrogen, but virtually no progesterone. The estrogen (mainly **estradiol**) which is released prepares the rest of the female reproductive tract for a pregnancy.

Estrogen (estradiol) has the following effects in the female during the follicular phase:
1. maintenance and development of the secondary (accessory) sexual organs (e.g. the vagina, uterus, Fallopian tubes, fimbriated funnel, the cervix)
2. maintenance and development of the secondary sexual characteristics (e.g. softer skin, breast development and growth, higher voice, fat deposition around the hips)
3. travels to the follicles to help stimulate oogenesis
4. inhibits the release of FSH from the anterior pituitary (adenohypophysis)
5. stimulates the proliferative phase of the endometrium in the uterus
6. causes the cervical mucus to become copious, watery and hospitable to sperm. This cervical mucus will dry in a characteristic "fern-leaf" pattern on a microscope slide.

- As the follicle matures into a Graafian follicle (the most mature follicle type) estrogen levels increase until **an estrogen surge occurs about 48 hours before ovulation**. The estrogen surge is a sudden, rapid increase in estrogen secretion over a short period of time (less than 24 hours).

- This estrogen surge from the Graafian follicle in the ovary stimulates ovulation by causing a **surge in LH release from the anterior pituitary by positive feedback about 24 hours before ovulation.** That is, the more estrogen that is released, then the more LH that is released. The LH released during the LH surge travels to the ovary and stimulates **ovulation (ovulation is the release of the oocyte from the ovary and into the fimbriated funnel).**

- **During most of the follicular phase, the increasing estrogen levels inhibit FSH release** from the anterior pituitary by negative feedback. This is how the combination oral contraceptive (which contains both estrogen and progesterone) can prevent pregnancy. A woman who is taking the combined oral contraceptive does not typically ovulate because her follicles do not develop (she has low FSH secretion) and her ovaries do not release an estrogen surge (so she does not ovulate).

OVULATION

- At ovulation (near the middle of the menstrual cycle), a secondary oocyte and several granulosa cells are released into the fimbriated funnel and the egg begins its journey down the Fallopian tube where it will either be fertilized or not fertilized. If the secondary oocyte is not fertilized, then it is washed out of the female reproductive tract during menstruation. If the secondary oocyte is fertilized, then it will become a zygote and travel to the uterus and implant in the endometrium and a pregnancy will be established.

THE LUTEAL PHASE OF THE MENSTRUAL CYCLE

- After ovulation, during the luteal phase (the second 14 days of the menstrual cycle), the corpus luteum in the ovary produces increasing amounts of progesterone and estrogen. The corpus luteum is formed from the remnants of the Graafian follicle that remain in the ovary after ovulation. That is, **the corpus luteum is made of two cell types, the luteal cells (which were the granulosa cells in the follicles) and the paraluteal cells (which were the theca interna cells in the follicles).** Much more progesterone is released from the corpus luteum than estrogen. The progesterone that is released helps prepare the female reproductive tract for a pregnancy.

Progesterone has the following effects in the female during the luteal phase:

1. increases basal body temperature by about 1/2 to 1 degree centigrade
2. inhibits the release of LH from the anterior pituitary (adenohypophysis). Prevents ovulation in women who are taking the pill. Women on the pill do not experience an LH surge, so they do not ovulate.
3. stimulates the secretory phase of the endometrium in the uterus
4. causes the cervical mucus to become thick, viscous and inhospitable to sperm. This cervical mucus will not dry in a characteristic "fern-leaf" pattern on a microscope slide.

- Remember that estrogen is also secreted during the luteal phase, but since progesterone levels are higher during the luteal phase the effects of progesterone are more pronounced than those of estrogen during the second half of the menstrual cycle. The estrogen that is secreted helps to maintain the secondary sexual organs and characteristics.