Hypothalamic and Pituitary Regulation: Female Reproductive Function

- Regulation achieved by hormones from the:
  - Hypothalamus
  - Pituitary
  - Ovary

- Hypothalamus \(\rightarrow\) gonadotropin-releasing hormone (GnRH), which travels to the pituitary to stimulate the secretion of FSH and LH
  - Both of these hormones act on the ovary and cause immature ovarian follicles to begin developing
  - The rising and falling of pituitary hormones create two interrelated cycles that occur on a periodic, monthly basis = ovarian and uterine cycles
Hypothalamic and Pituitary Regulation: Female Reproductive Function – continued

- Under the influence of FSH and LH, several ovarian follicles begin the maturation process each month
- On approximately day 14 of the ovarian cycle, a surge of LH causes one follicle to expel its oocyte (ovulation)
- The ruptured follicle, minus its oocyte, remains in the ovary and is transformed into the hormone-secreting corpus luteum
- The oocyte begins its journey through the uterine tube and eventually reaches the uterus
- If conception does not occur, the outer lining of the uterus degenerates and is shed to the outside during menstruation

Ovarian Control of Female Reproductive Function

- As ovarian follicles mature, they secrete estrogen and progesterone
- Estrogen is a generic term for 3 different hormones
  - Estradiol
  - Estrone
  - Estriol
- Estrogen is responsible for the maturation of the female reproductive organs and for the appearance of secondary sex characteristics
- Other estrogen contributions:
  - Helps to maintain low blood cholesterol levels
  - Facilitates Ca+ uptake by bones
Unit 7: Part 2

Oral Contraceptives

- In the last half of the ovarian cycle, the corpus luteum secretes a class of hormones called progestins, the most abundant is progesterone.
- In combination with estrogen, progesterone promotes breast development and regulates the monthly changes in the uterine cycle.
- Under influence of estrogen and progesterone, the uterine endometrium becomes vascular and thickens in preparation for receiving the fertilized egg.
- High estrogen and progesterone levels in the final third of the uterine cycle provide negative feedback to shut off GnRH, FSH and LH secretion.
- Without stimulation from FSH and LH, estrogen and progesterone levels fall, the endometrium is shed, and menstrual bleeding begins.

Estrogens and Progestins as Oral Contraceptives

- Most contraceptives contain a combination of estrogen and progestin.
  - A few contain only progestin.
- **Ethinyl estradiol**: the most common estrogen used for contraception.
- **Norethindrone**: the most common progestin.
- Usually, drug administration of an oral contraceptive begins of day 5 of the ovarian cycle, and continues for 21 days.
- During the other 7 days, the patient takes a placebo.
- Missed pills? What to do?
- Estrogen-progestin oral contraceptives act by providing negative feedback to the pituitary to shut down the secretion of LH and FSH.
  - Without the influence of these hormones, the ovarian follicle cannot mature and ovulation is prevented.