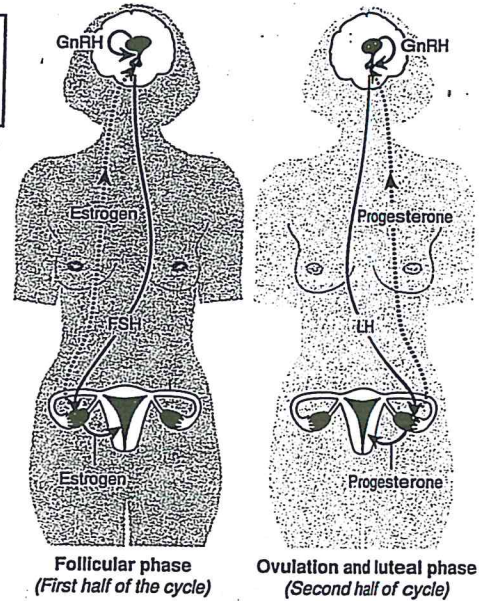
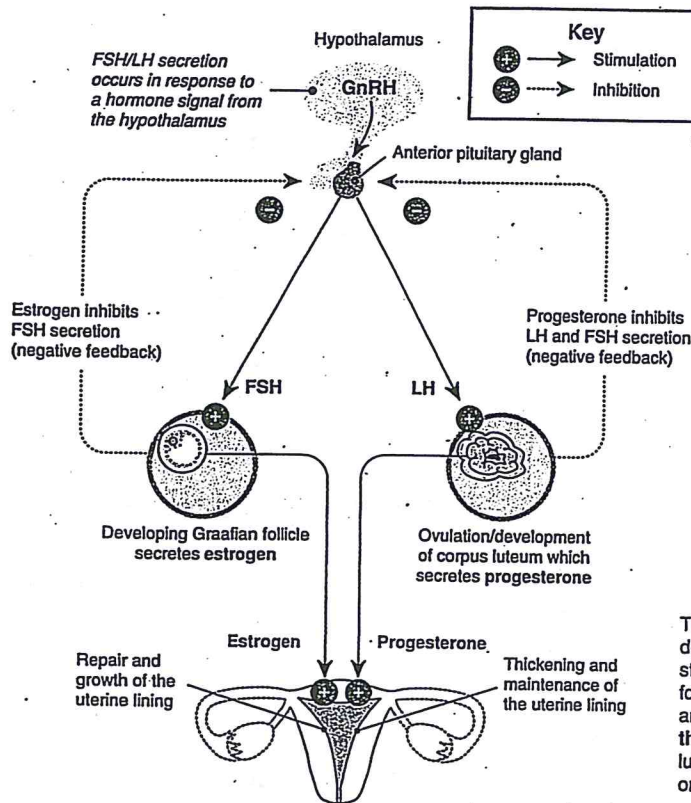


Control of the Menstrual Cycle

The female menstrual cycle is regulated by the interplay of several reproductive hormones. The main control centers for this regulation are the **hypothalamus** and the **anterior pituitary gland**. The hypothalamus secretes GnRH (gonadotropin releasing hormone), a hormone that is essential for normal gonad function in males and females. GnRH is transported in blood vessels to the anterior pituitary where it brings about the

release of two hormones: follicle stimulating hormone (FSH) and luteinizing hormone (LH). It is these two hormones that induce the cyclical changes in the ovary and uterus. Regulation of blood hormone levels during the menstrual cycle is achieved through **negative feedback mechanisms**. The exception to this is the mid cycle surge in LH, which is induced by the rapid increase in estrogen secreted by the developing follicle.

Control of the Menstrual Cycle



The diagrams above and left summarize the hormonal controls during the menstrual cycle. In the first half of the cycle, FSH stimulates follicle development in the ovary. The developing follicle secretes estrogen which acts on the uterus and, in the anterior pituitary, inhibits FSH secretion. In the second half of the cycle, LH induces ovulation and development of the corpus luteum. The corpus luteum secretes progesterone which acts on the uterus and also inhibits further secretion of LH and FSH.

- Using the information above and on the previous page, complete the table below summarizing the role of hormones in the control of the menstrual cycle. To help you, some of the table has been completed:

Hormone	Site of secretion	Main effects and site of action during the menstrual cycle
GnRH		
		Stimulates the growth of ovarian follicles
LH		
		At high levels, stimulates LH surge. Promotes growth and repair of the uterine lining.
Progesterone		

- Briefly explain the role of negative feedback in the control of hormone levels in the menstrual cycle:

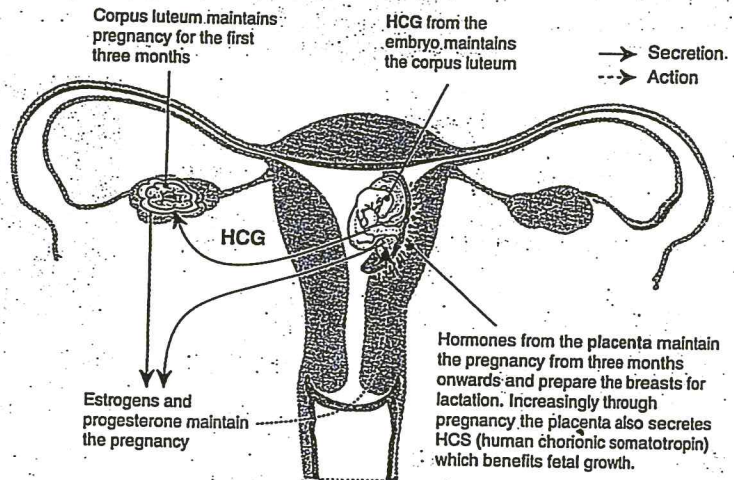
- FSH and LH (also known as interstitial cell stimulating hormone in males) also play a central role in male reproduction. Refer to the activity *Male Reproductive System* and state how these two hormones are involved in male reproduction:

The Hormones of Pregnancy

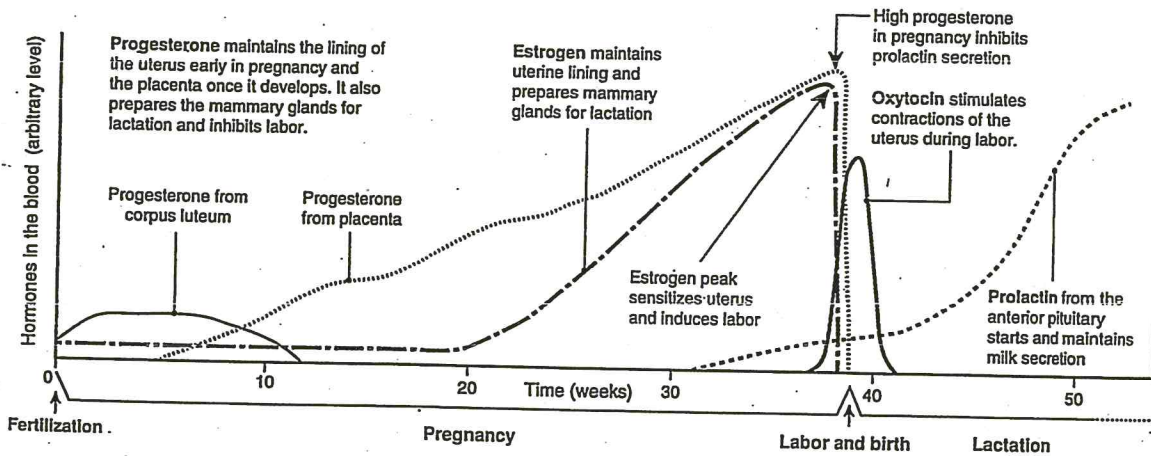
Human reproductive physiology occurs in a cycle (the menstrual cycle) which follows a set pattern and is regulated by the interplay of several hormones. Control of hormone release is brought about through feedback mechanisms: the levels of the female reproductive hormones, estrogen and progesterone, regulate the secretion of the pituitary hormones that control the

ovarian cycle (see earlier pages). Pregnancy interrupts this cycle and maintains the corpus luteum and the placenta as endocrine organs which maintain the developing fetus for the period of its development. During the last month of pregnancy, the hormone oxytocin (from the posterior pituitary) induces the uterine contractions that will expel the baby from the uterus.

- HCG (Human chorionic gonadotropin)**
 - ▶ Secreted by the developing embryo
 - ▶ Maintains corpus luteum
- Progesterone**
 - ▶ Maintains endometrium
 - ▶ Inhibits uterine contraction
- Estrogens**
 - ▶ Maintain endometrium
 - ▶ Prepare mammary glands for lactation
 - ▶ High levels induce labor
- Human placental lactogen (HPL)**
 - ▶ Stimulates breast growth and development
- Relaxin**
 - ▶ Produced by the placenta towards the end of the pregnancy
 - ▶ Relaxes pubic symphysis at birth
 - ▶ Helps dilate cervix at birth



Hormonal Changes During Pregnancy, Birth, and Lactation



During the first 12-16 weeks pregnancy, the corpus luteum secretes enough progesterone to maintain the uterine lining and sustain the embryo. After this, the placenta takes over as the primary endocrine organ of pregnancy. Progesterone and estrogen from the placenta maintain the uterine lining, inhibit the development of further ova (eggs), and prepare the breast tissue for lactation (milk production). At the end of pregnancy, the placenta loses competency,

progesterone levels fall, and high estrogen levels trigger the onset of labor. The estrogen peak coincides with an increase in oxytocin. Oxytocin stimulates uterine contractions in a positive feedback loop. The contractions and the increasing pressure of the cervix from the infant stimulate release of more oxytocin, and more contractions and so on, until the infant is born. After birth, prolactin secretion increases. Prolactin maintains lactation during the period of infant nursing.

1. (a) Why is the corpus luteum the main source of progesterone in early pregnancy? _____
- (b) What hormones are responsible for maintaining pregnancy? _____
2. (a) Name two hormones involved in labor (onset of the birth process): _____
- (b) Describe two physiological factors in initiating labor: _____