

**Unit P Notes #4 -Uterine Cycle**  
**And the Role and Regulation Of Female**  
**Hormones**

- The uterine cycle consist of three key stages (changes that occur in the endometrium of the uterus)

**1) Menses (Menstruation)**

**2) Proliferative Phase**

**3) Secretory Phase**

**A ) Uterine Cycle:-**

**1) - Days 1 –5 Menstruation**

- If pregnancy does not take place the corpus luteum of the ovary degenerates, this results in the **drop in the level of both estrogen and progesterone.**

- This drop in sex hormones causes the Endometrium (lining of Uterus) to break down.

- Cells of the endometrium, blood vessels, and blood are shed from the uterus and exit the vagina.

- A flow of blood (*called menses*) passes out of the vagina during a period called *menstruation*.

## 2) - Day 6 – 13 Proliferative phase

- FSH has been released, it acts to stimulate a primary follicle to develop (this is part of the OVARIAN cycle) As the follicle develops, it produces **ESTROGEN**, this estrogen causes the endometrium to rebuild.

- Endometrium becomes thick and vascularized in preparation for the possible implantation of a fertilized egg → developing embryo

## *Day 14 - Ovulation*

- **Ovulation occurs (release of the egg during ovarian cycle)**

**3) - Day 15 –28 Secretory Phase**

**- Corpus luteum forms in the ovary and it begins to produce higher levels of **Progesterone** and Estrogen.**

**- This causes the endometrium to double in thickness**

**- Uterine Glands produce thick secretions of mucous**

**- Now the uterus is prepared to receive embryo.**

**\* If no pregnancy. The corpus luteum degenerates, decrease in progesterone production occurs and the endometrium breaks down**

**→ Then “Uterine Cycle” starts all over again**

**→ Day 1-5**

Ovarian Cycle	Events	Uterine Cycle	Events
Follicular phase—Days 1–13	FSH Follicle maturation Estrogen	Menstruation—Days 1–5 Proliferative phase—Days 6–13	Endometrium breaks down Endometrium rebuilds
<b>Ovulation—Day 14*</b>	LH spike		
Luteal phase—Days 15–28	LH  Corpus luteum Progesterone	Secretory phase—Days 15–28	Endometrium thickens glands are secretory

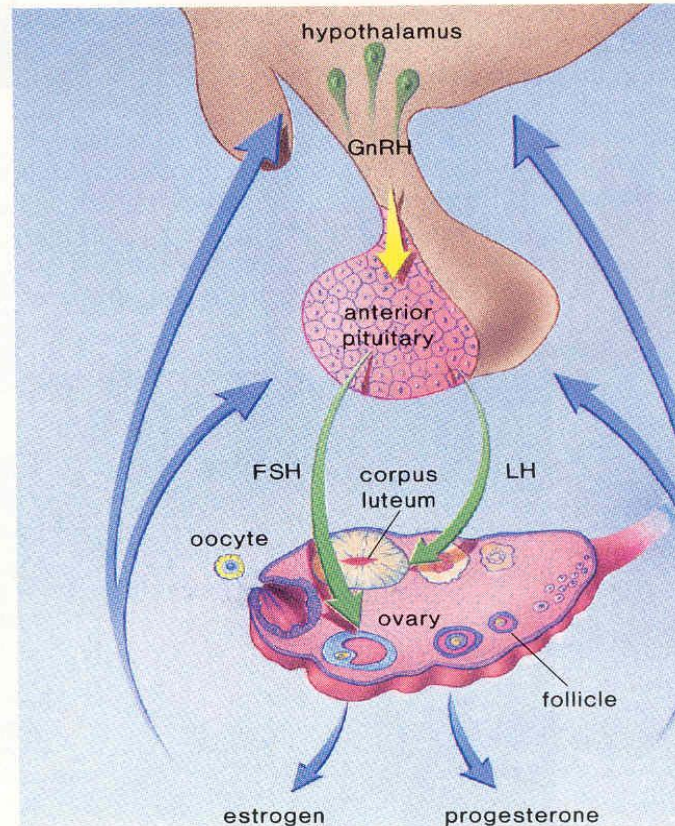
## **B) Control of Cycles by Hormones:**

The hypothalamus produces GnRH (gonadotropin-releasing hormone).

GnRH stimulates the anterior pituitary to produce FSH (follicle-stimulating hormone) and LH (luteinizing hormone).

FSH stimulates the follicle to produce estrogen and LH stimulates the corpus luteum to produce progesterone.

Estrogen and progesterone affect the sex organs (e.g., uterus) and the secondary sex characteristics and exert feedback control over the hypothalamus and the anterior pituitary.



### **1) FSH**

**- Hypothalamus secretes GnRH (gonadotropin releasing hormone) and causes**



**the anterior pituitary to secrete the following gonadotropic hormones in higher levels**

**FSH (days 1-13, but present all the time)**

**LH (days 14-28, but present all the time)**

**- FSH causes follicles to mature. Maturing follicles produce and releases estrogen.**

**- Increase in estrogen concentration should cause the anterior pituitary to stop producing FSH, but in fact there is an initial surge of GnRH released by the hypothalamus.**

**This acts in a positive feedback mechanism to produce a surge of FSH and LH just toward the end of the follicular phase. ( ≈ day 12-13)**

## **2. LH**

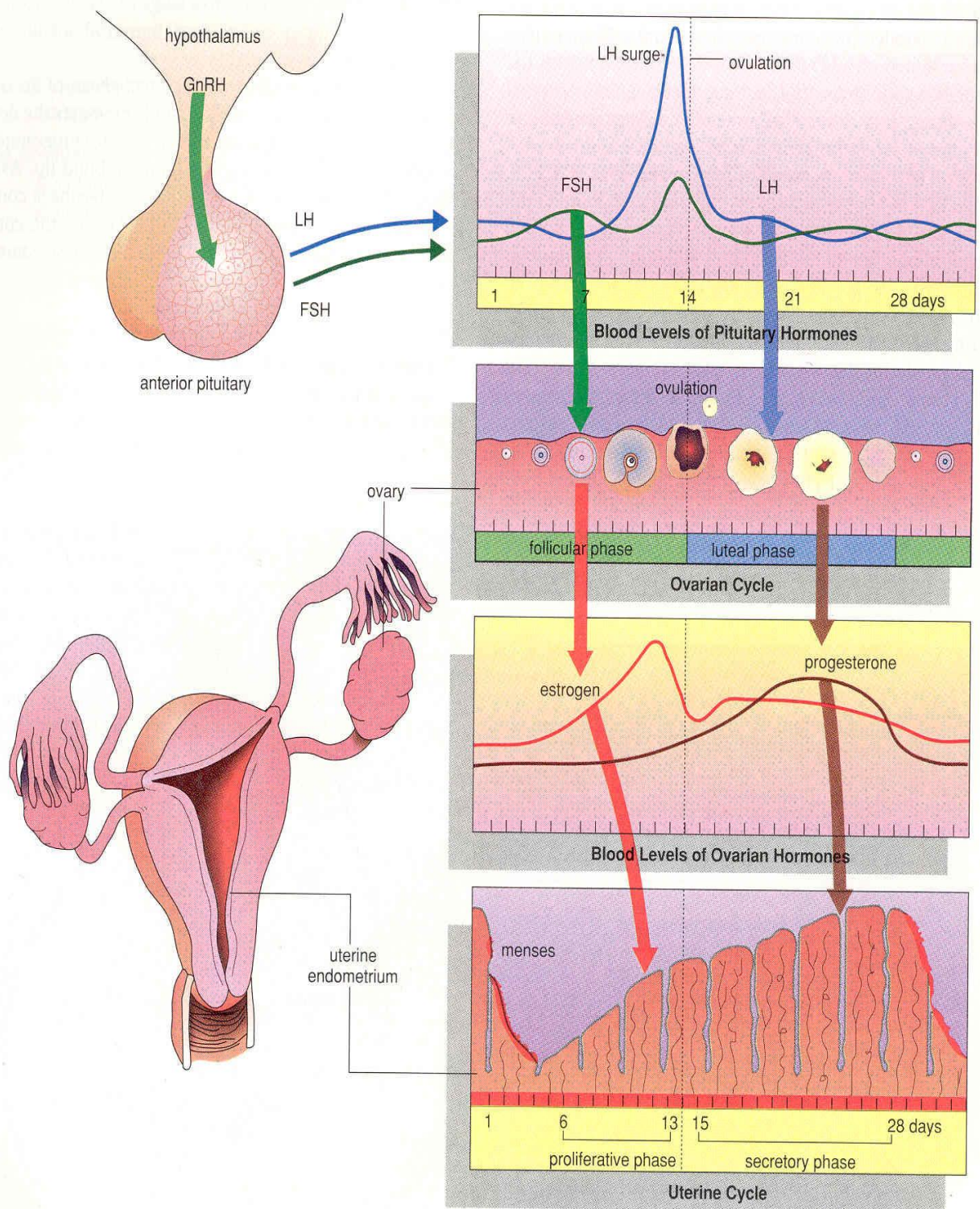
**- LH is primarily released from the Ant. Pit. Gland between days 12 – 28**

**- Causes the corpus luteum to form and helps with ovulation.**

**- Corpus luteum goes on to produce progesterone**

**- Increase in progesterone cause anterior pituitary to stop producing LH.**

- By day 15, LH has increased enough to initiate the luteal phase (formation and development of corpus luteum).**
- Before day 28, Progesterone has maxed out , this causes the anterior pituitary to stop the release of LH. As a result corpus luteum breaks down, so estrogen and progesterone production shuts down.**

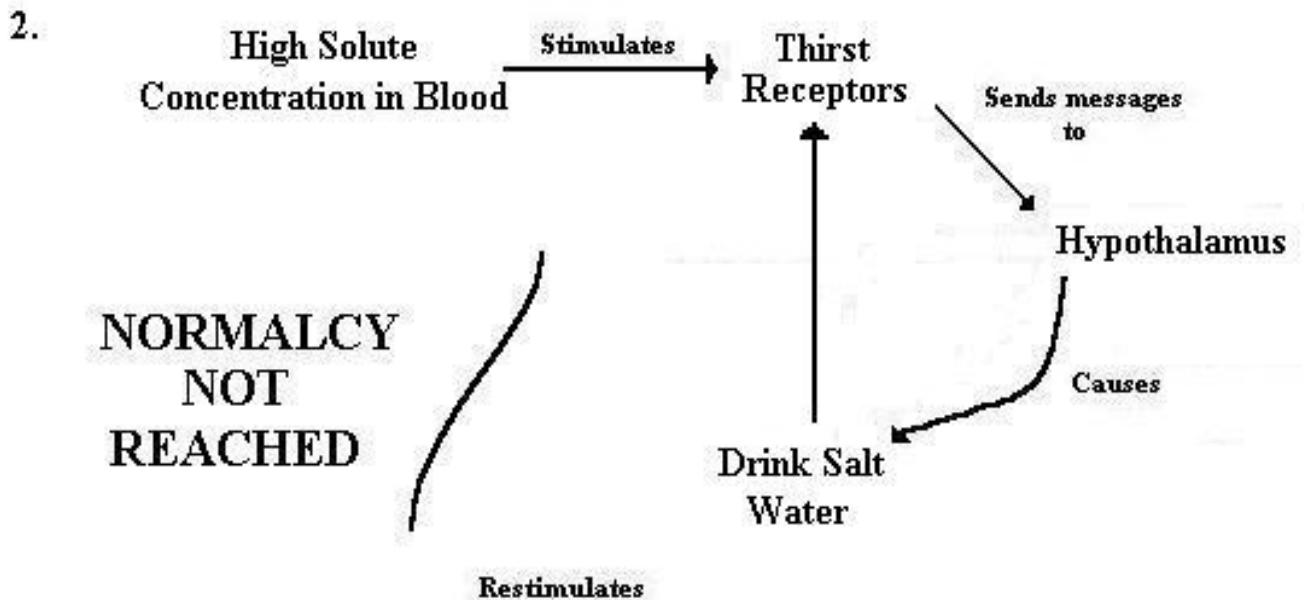


### C) The Hormone Oxytocin Role and Regulation

- Oxytocin is produced by the hypothalamus and stored in the posterior pituitary gland. It is released to stimulate the uterus to contract during delivery. It can also be given in an IV to induce birth.

- Oxytocin follows a **positive feedback** loop until the hypothalamus has detected that the delivery is complete.

#### EXAMPLE OF POSITIVE FEEDBACK





**-Oxytocin also causes mammary glands to release milk. Lobules containing milk contract forcing milk into ducts that lead to the nipple.**

#### **D) Implantation:**

- Implantation occurs in the uterus**
- Fertilization usually occurs in the oviduct.**
  
- Embryo embeds itself in the endometrium several days after fertilization.**
  
- Membrane surrounding the embryo (eventually forms the placenta) produces a hormone called HCG (Human Chorionic Gonadotropic hormone).** This hormone prevents the corpus luteum from disintegrating, and act to promote an increase in the level of progesterone being released.
  
- HCG is found immediately in the blood, and after a few days later it shows up in the urine. Ex Pregnancy test. (About one week later)**

#### **Placenta**

- Contains both maternal and fetal tissue**
- Area where gas and nutrients exchange occurs.**
- \* No exchange of blood cells.**

**Placental tissues continue to produce HCG, progesterone (prevents breakdown of the endometrium) and estrogen (keeps new egg from developing)**