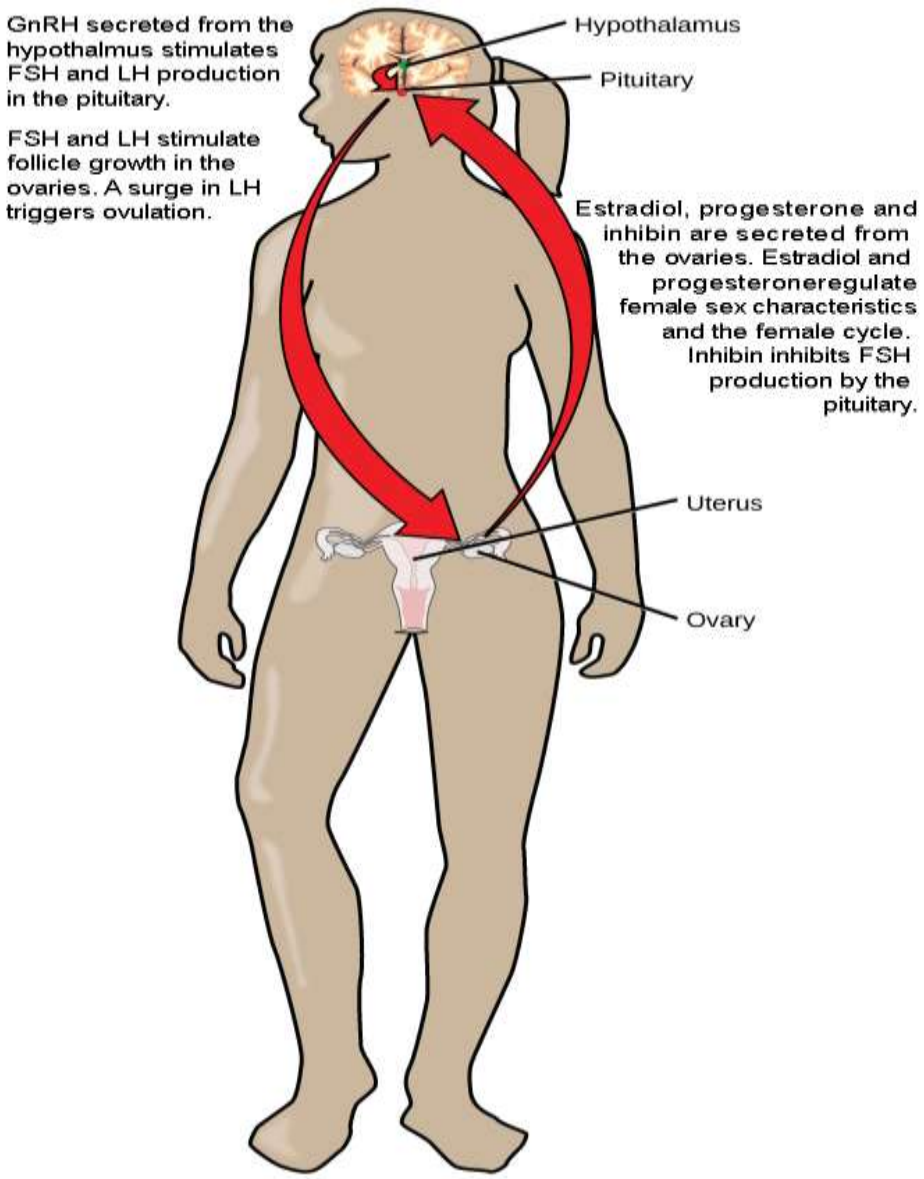
Regulation of the Female Reproductive System

In females, FSH stimulates development of egg cells, called ova, which develop in structures called follicles. Follicle cells produce the hormone inhibin, which inhibits FSH production.

LH also plays a role in the development of ova, induction of ovulation, and stimulation of estradiol and progesterone production by the ovaries, as illustrated in Figure.

Estradiol and progesterone are steroid hormones that prepare the body for pregnancy.

Estradiol produces secondary sex characteristics in females, while both estradiol and progesterone regulate the menstrual cycle.


GnRH secreted from the hypothalmus stimulates FSH and LH production in the pituitary.
FSH and LH stimulate follicle growth in the ovaries. A surge in LH triggers ovulation.
Hypothalamus
Pituitary
Estradiol, progesterone and inhibin are secreted from the ovaries. Estradiol and progesteroneregulate female sex characteristics and the female cycle. Inhibin inhibits FSH production by the pituitary.
Uterus
Ovary

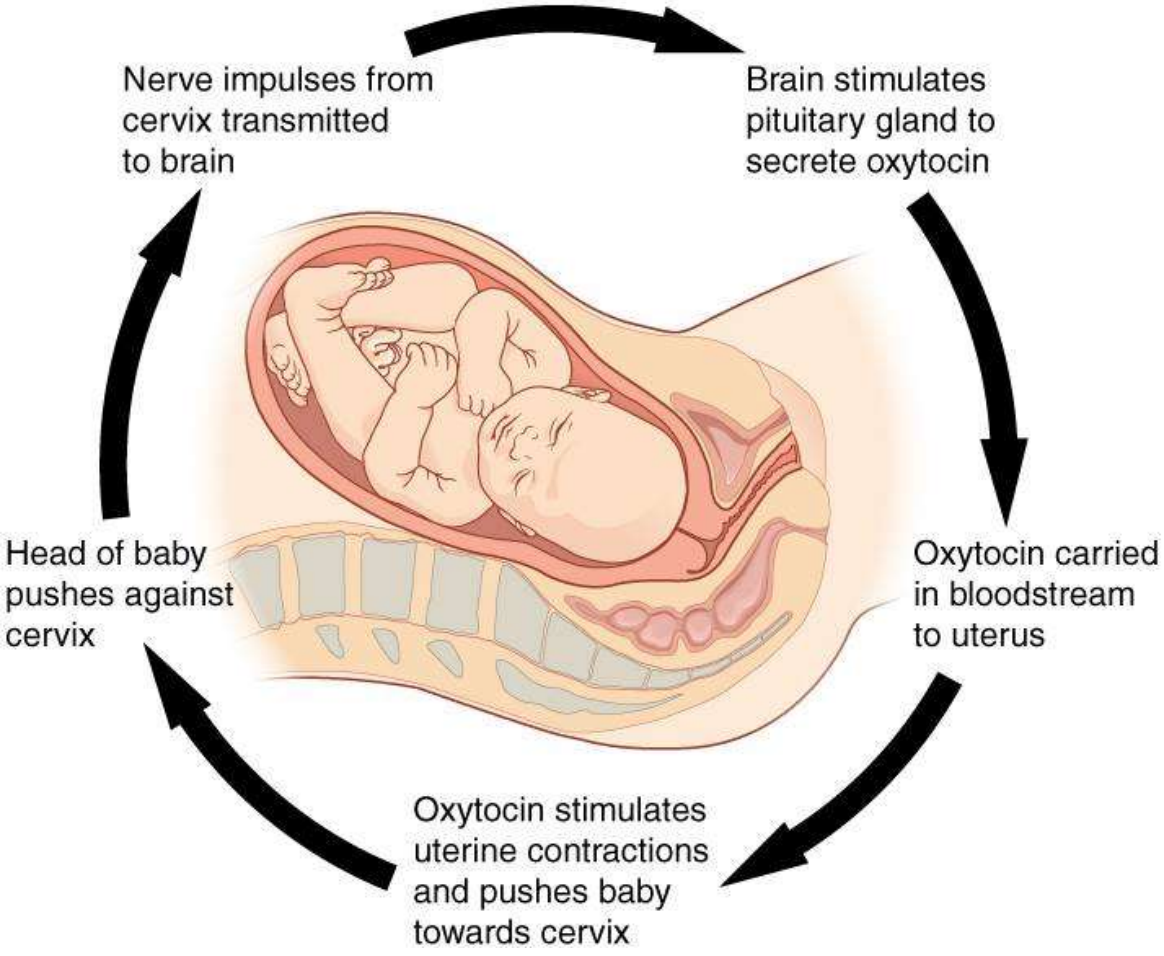
In addition to producing FSH and LH, the anterior portion of the pituitary gland also produces the hormone **prolactin (PRL). Prolactin** stimulates the production of milk by the mammary glands following childbirth. Prolactin levels are regulated by the hypothalamic hormones **prolactin releasing hormone (PRH) and prolactin-inhibiting hormone (PIH),** PRH stimulates the release of prolactin and PIH inhibits it.

The posterior pituitary releases the hormone **oxytocin**, **which stimulates** uterine contractions during childbirth. The uterine smooth muscles are not very sensitive to oxytocin until late in pregnancy when the number of oxytocin receptors in the uterus peaks. Stretching of tissues in the uterus and cervix stimulates oxytocin release during childbirth.

Contractions increase in intensity as blood levels of oxytocin rise via a positive feedback mechanism until the birth is complete.

Oxytocin also stimulates the contraction of myoepithelial cells around the milk producing mammary glands. As these cells contract, milk is forced from the secretory alveoli into milk ducts and is ejected from the breasts in milk ejection ("let-down") reflex. Oxytocin release is stimulated by the suckling of an infant, which triggers the synthesis of oxytocin in the hypothalamus and its release into circulation at the posterior pituitary.

Oxytocin and uterine contractions



Hormonal control of lactation

1. Suckling stimulates nerves in the nipple and areola that travel to the hypothalamus.

2. In response, the hypothalamus stimulates the posterior pituitary to release oxytocin and the anterior pituitary to release prolactin.

3. Oxytocin stimulates lobules in the breast to let down (release) milk from storage. Prolactin stimulates additional milk production.