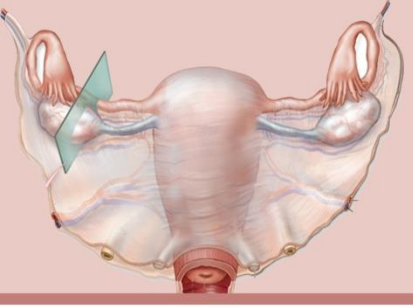

Parturition & Lactation

By

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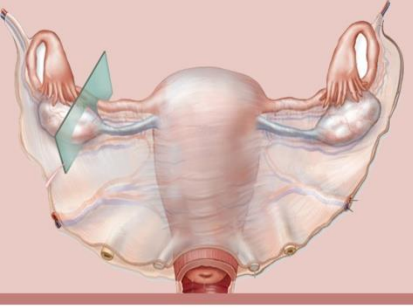
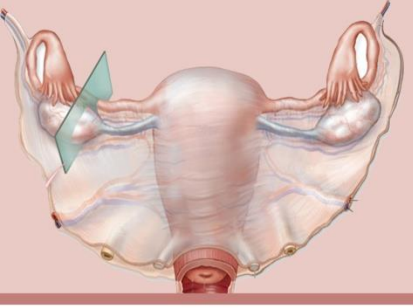


Labour = parturition
= childbirth

- **Definition :**

  It is the process by which the fetus is delivered from the uterus after the full term of pregnancy

  280 days after the first day of the last menstrual period (roughly 40 weeks)

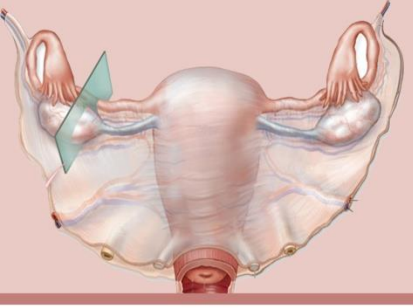


- **Causes :**

By the end of pregnancy , the uterus becomes progressively more excitable until it begins strong contraction that cause birth of the baby .

1. Hormonal factors

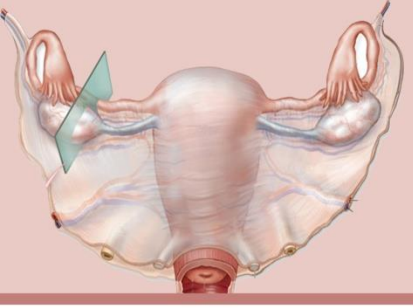
- Estrogen / progesterone ratio increases by the end of pregnancy
- Estrogen enhances uterine contractility while progesterone reduces it
- ↑ Estrogen / progesterone ratio will increase uterine excitability as Estrogen increase the number of oxytocin receptors in the myometrium so, increasing the uterine sensitivity to oxytocin action.



- **Prostaglandins**: Released from endometrium and increase uterine contractility .
- **Relaxin**: This hormone inhibits uterine contractions & Its secretion decreases in the last days of pregnancy (helping initiation of labor).
- **Oxytocin**: During early labor, the plasma oxytocin level is normal but it causes uterine contractions due to a marked increase in the oxytocin receptors.
- **Oxytocin causes uterine contractions by**:

(a) A direct effect on the uterine smooth muscle cells

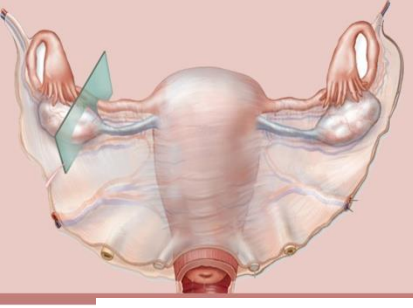
(b) Stimulation of formation of **prostaglandins**

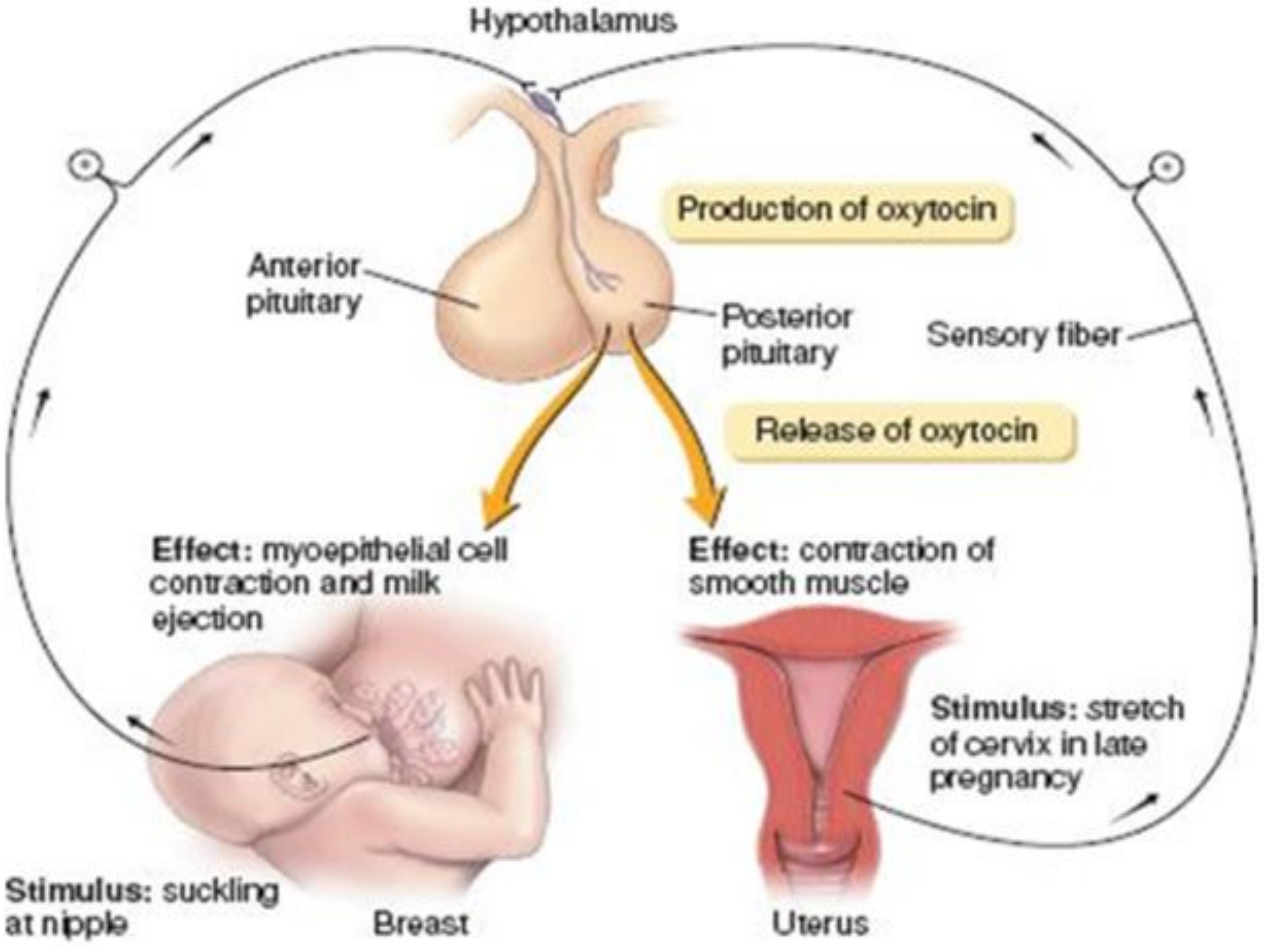


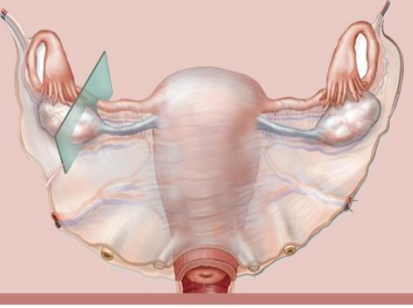
2. Mechanical factors:

- Stretch of smooth muscles in the wall of uterus increases uterine contractility.
- Stretch of cervix by **head** of fetus cause stimulation of stretch receptors in the cervix & send afferent nerve impulses travel into spinal cord and cause **two positive feedback mechanisms**

1. Uterine contraction via neural reflex cause descend of head of fetus. **2. Release of oxytocin** from maternal posterior pituitary cause strong uterine contraction lead to more descend of head & more stretch of cervix.




Hypothalamus
Production of oxytocin
Anterior pituitary
Posterior pituitary
Sensory fiber
Release of oxytocin
Effect: myoepithelial cell contraction and milk ejection
Effect: contraction of smooth muscle
Stimulus: stretch of cervix in late pregnancy
Stimulus: suckling at nipple
Breast
Uterus

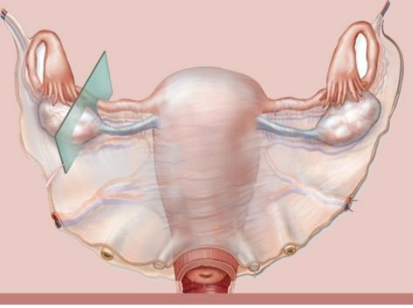


C. Contraction of abdominal muscles:

- Pain signals from uterus & birth canal ⇨ neurogenic reflex to spinal cord

⇨ abdominal muscle contraction ⇨ ⇧ intra abdominal pressure.

Also, voluntary contraction of abdominal muscle by straining.



D. Role of fetus:

- Strong uterine contraction ⇨ **P**ressure on the fetus.

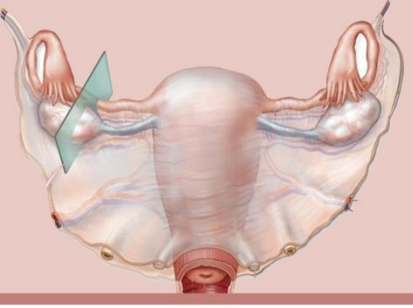
- **P**ressure on the fetus head is a stress ⇨ stimulate the fetus hypothalamus

⇨ ⇧ CRF ⇨ ⇧ ACTH from the fetus anterior **P**ituitary gland

⇨ ♍■♍❒♍♋♦♍ **cortisol level** from fetus adrenal cortex causes:

1. ⇩ **P**lacental **P**rogesterone concentration ⇨ ⇧ uterine contractility.

2. ⇧ **P**rostaglandins secretion ⇨ **P**owerful uterine contraction.



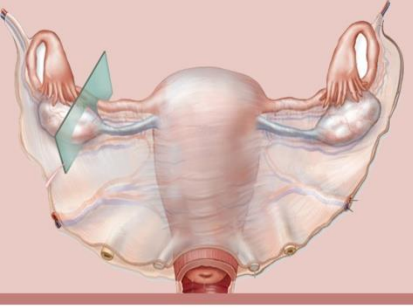
local prostaglandin production

plays several roles in labor and delivery.

(1) Prostaglandins increase the intracellular calcium concentration of uterine smooth muscle, thereby increasing its contractility.

(2) Prostaglandins also promote gap junction formation between uterine smooth muscle cells to permit synchronous contraction of the uterus.

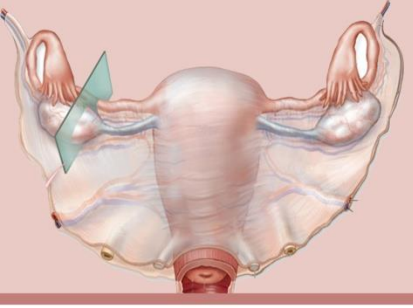
(3) Prostaglandins cause softening, thinning (effacement), and dilation of the cervix early in labour.



- **Suggested mechanism of labour :**

Once uterus contracts a positive feedback mechanism is initiated causing dilatation of the cervix which will cause :

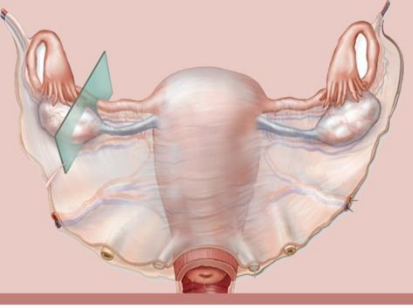
- **More uterine contraction via neural reflex .**
- **More release of oxytocin that produces more uterine contractions and so on .**



There are three stages of **normal labor.**

- In the **first stage,** uterine contractions originating at the fundus and sweeping downward move the head of the fetus toward the cervix and progressively widen and thin the cervix.

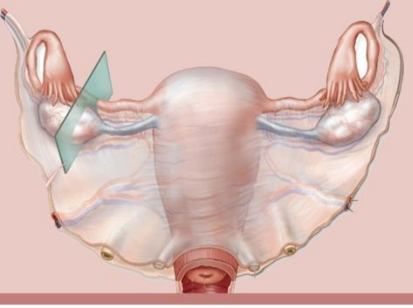
- In the **second stage,** the fetus is forced through the cervix and delivered through the vagina.



In the **third stage,** the placenta separates from the uterine decidual tissue and is delivered.

During this **last stage**, powerful contractions of the uterus also serve to constrict uterine blood vessels and limit postpartum bleeding.

After delivery of the placenta, the hormones concentrations return to their prepregnant levels, except for **prolactin**, whose levels remain high if the mother breast-feeds the infant



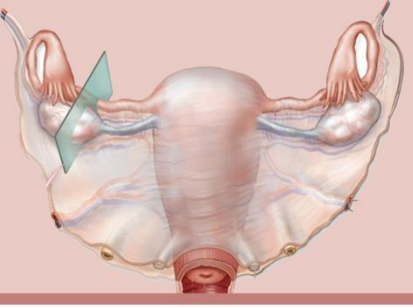
After delivery of fetus:

- Contraction of uterus (during 10 - 45 minutes) ⇨ shearing movement with

placenta ⇨ separation of placenta ⇨ vaginal discharge .

- After that, the endometrium is re-epithelized again

- Lactation ⇨ involution of uterus (⇧ prolactin ⇨ ⇩ gonadotropins).

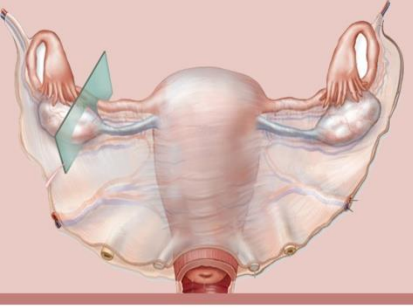


Mammary glands

- **Development :**

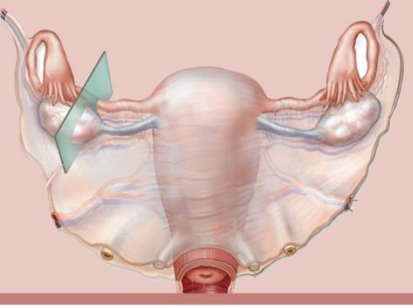
1. During childhood : mammary glands are rudimentary .
2. At puberty : mammary glands enlarge and develop under the effect of estrogen and progesterone secreted from ovaries .
3. During pregnancy : more enlargement and development occur by high levels of estrogen and progesterone and prolactin and human chorionic somatomammotropin (HCS)

1. During lactation
   - Milk formation : by prolactin .
   - Milk ejection : by oxytocin .



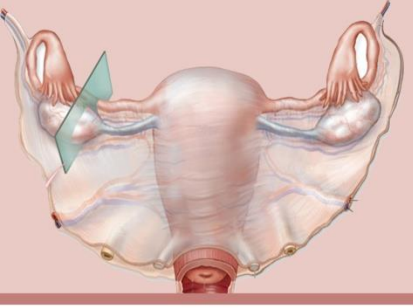
Throughout pregnancy, **estrogen and progesterone** stimulate the growth and development of the breasts, preparing them for lactation.

Estrogen also stimulate prolactin secretion by the anterior pituitary, and prolactin levels steadily increase over the course of pregnancy, However, although prolactin levels are high during pregnancy, lactation ***does not*** occur because estrogen and progesterone block the lactogenic action of prolactin



- **After parturition,** when estrogen and progesterone levels fall so, their inhibitory effects on prolactin action are removed and lactation can proceed.
- **lactation** is maintained by suckling, which stimulates the secretion of both oxytocin and prolactin.

If lactation continues, there is suppression of ovulation because prolactin inhibits GnRH secretion by the hypothalamus and FSH and LH secretion by the anterior pituitary.



Lactation

The initiation of milk production (lactogenesis) is under hormonal control of:

prolactin hormone from anterior pituitary gland.

- True milk production starts **two days** after delivery.

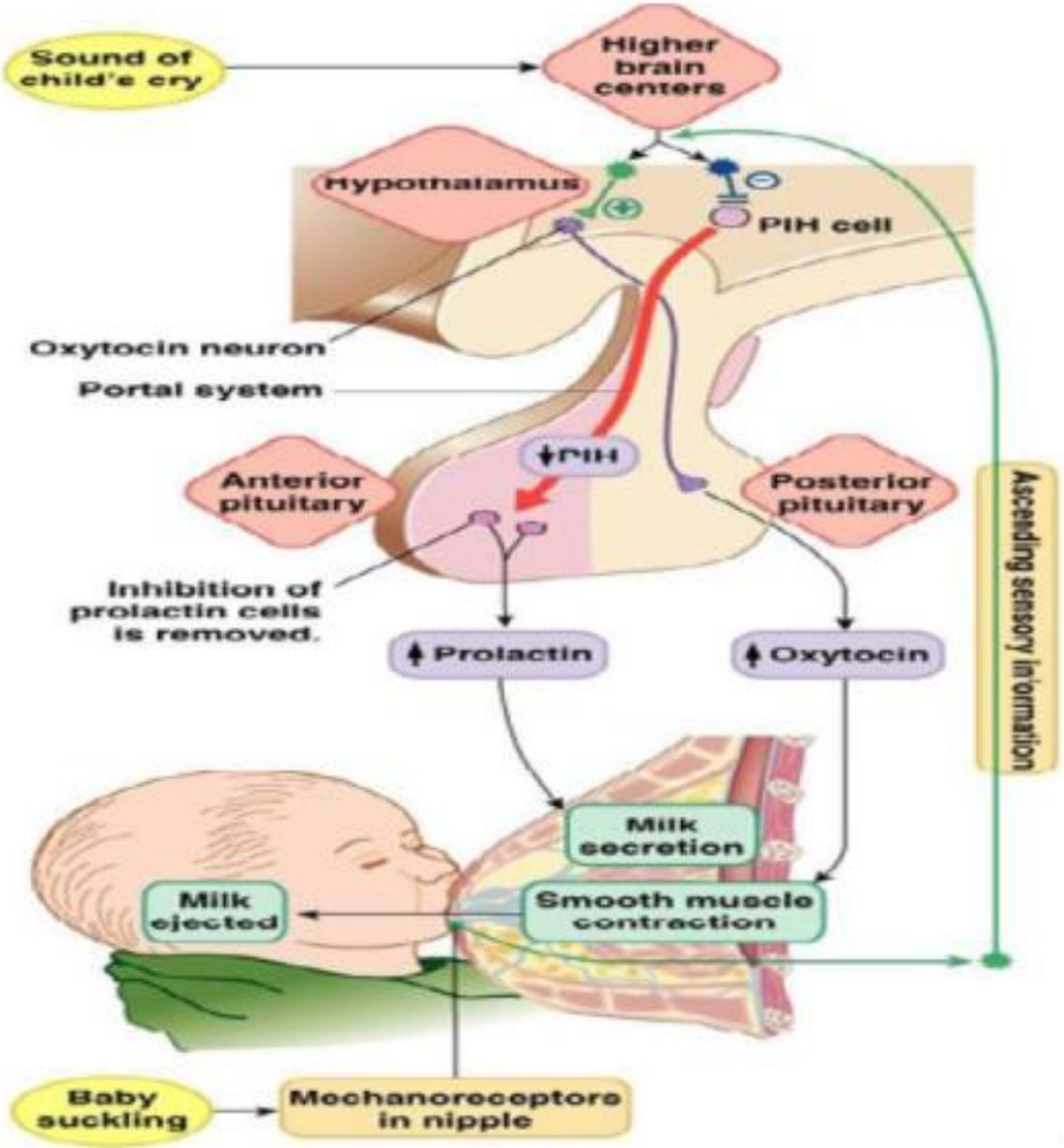
- **Suckling** helps lactation by two mechanisms:

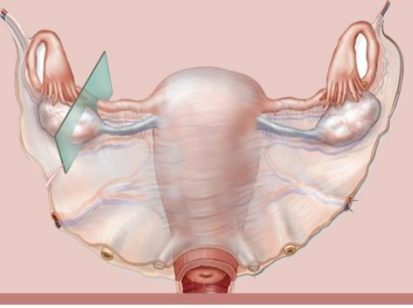
a) Maintenance of prolactin secretion ⇨ maintenance of milk formation.

b) Ejection of milk by oxytocin (suckling reflex).

- With continued suckling, lactation can continue for years.

- ⇧ Prolactin ⇨ depress ovulation & fertility (**lactation amenorrhea**).


Sound of child's cry
Higher brain centers
Hypothalamus
PIH cell
Oxytocin neuron
Portal system
PIH
Anterior pituitary
Posterior pituitary
Ascending sensory information
Inhibition of prolactin cells is removed.
Prolactin
Oxytocin
Milk secretion
Milk ejected
Smooth muscle contraction
Baby suckling
Mechanoreceptors in nipple



Hormonal control of mammary glands

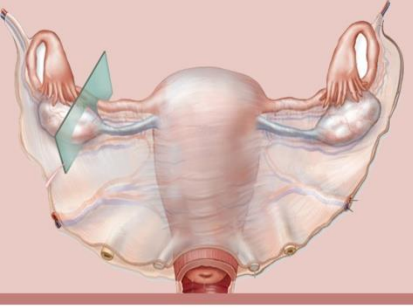
1- Estrogen:

- Stimulates Proliferation of **duct** system and nipples.
- It increases Blood flow to breast.
- It is responsible for Pigmentation of areolas.

2- Progesterone: Stimulates formation of mammary gland **acini.**

3- Prolactin: Secreted by anterior pituitary

It stimulates formation and secretion of milk by acini.



4- Placental Lactogen (human chorionic somatomammotropin (HCS) stimulates breast development.

5- Oxytocin: It squeezes milk from acini.

6- Adrenal corticoids & Thyroxin & insulin:

- needed for **metabolic** activities of the gland, no specific role in milk production.

7- Growth hormone:

- necessary for mammary gland development


THank you